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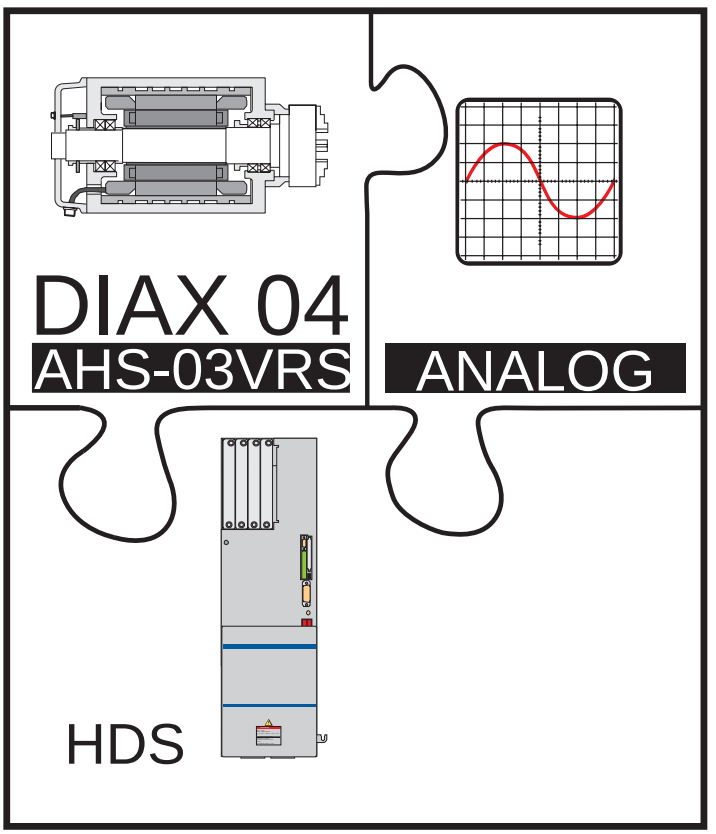

DIAX04
Drive With Main Spindle Function, Analog- and Parallelinterface

Functional Description: AHS 03VRS

DOK-DIAX04-AHS-03VRS**-FK01-EN-P

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What is the purpose of this documentation?

The following documentation describes the functions of the firmware FWA-DIAX04-AHS-03VRS.

This documentation serves trained maintenance personnel:

- for Description of all functional features
- for parameterization of the drive controller
- for data security of the drive parameter
- for error diagnosis and error removal

Course of modifications

Document identification of previous and present output	Release Date	Remarks
DOK-DIAX04-AHS-03VRS**-FK01-EN-P	08.98	First edition

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Supplement B: Diagnostic Message Description

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Sales & Service Facilities

1 System Overview

1.1 Range of Uses

DIAX04 is a family of digital, intelligent drives. DIAX04 offers solutions for applications in the following markets:

- Converting
- Printing
- Packaging
- General Industrial Automation

DIAX04 consists of:

- Operation with the complete line of INDRAMAT motors
- Complete power range from 1kW to 100kW
- User-friendly software features
- Adaptability to various applications by configuring the drive with optional plug-in cards

1.2 DIAX04 - a Drive Family

There are five application-releated firmware variants available for the **DIAX04 family:**

FWA-DIAX04-ELS-0xVRS-MS	• Drive With Electric Gear Function
FWA-DIAX04-SSE-0xVRS-MS	• Drive With Servo Function
FWA-DIAX04-ASE-0xVRS-MS	• Drive With Servo Function, Analog And Parallelinterface
FWA-DIAX04-SHS-0xVRS-MS	• Main Spindle Drives
FWA-DIAX04-AHS-0xVRS-MS	• Drive With Main Spindle Function, Analog- and Parallelinterface

The following function description relates to the firmware variant:

FWA-DIAX04-AHS-0xVRS-MS	• Drive With Main Spindle Function, Analog- and Parallelinterface

For each listed variant, there is individual documentation.

1.3 Drive Controllers

The **DIAX04** family consists of 4 drive controller types:

Modular Drive Controllers:

- HDS 02.1
- HDS 03.1
- HDS 04.1
- HDD 02.1 (not possible with DIAX04-AHS)
- HDS 02.2
- HDS 03.2
- HDS 04.2
- HDD 02.2 (not possible with DIAX04-AHS)

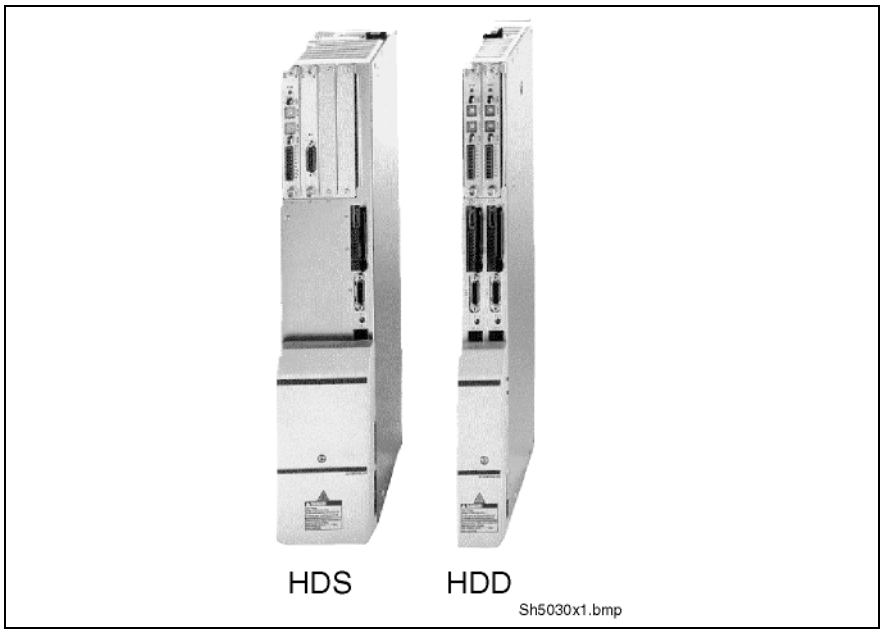


Fig. 1-1: Drive controllers

1.4 Function Overview: FWA-DIAX04-ASE-02VRS-MS

Command Communications Interfaces

- Analog interface
- Parallel interface

Possible Operating Modes

- Torque control
- Velocity control
- Drive internal interpolation
- Relative Drive internal interpolation

Supported motor types

Rotary motors:
MHD
MKD
2AD
ADF
1MB
MBW
MBS

Supported Measuring Systems

- LSF, DSF, HSF
- Resolver
- Incremental encoder with sine signals, uA or 1V signals
- Gear wheel encoder
- Incremental encoder with rectangular signals, SSI interface
- Encoder with EnDat interface
- Resolver without feedback data memory, gear wheel encoder with 1Vpp-signals
- Resolver without feedback data memory & sine encoder

The possible combinations are described in the chapter "measuring systems".

General Functions

- Extensive diagnostics options
- Basic parameter block that can be activated for a defined setting of the drive parameters to default values.
- Customer passwords
- Error memory and operating hour counter
- Configurable signal status word
- Supports five (5) languages for parameter names and units and diagnoses (S-0-0095)
  - German
  - English
  - French
  - Spanish
  - Italian
- Settable drive-internal position resolution
- Evaluation of option (load-side) encoder for position and/or velocity control
- Evaluates absolute measuring system with setting of absolute dimension
- Modulo function
- Parametrizable torque force limit
- Current limit
- Velocity limit
- Drive-side error reactions:
  - best possible standstill "velocity command to zero"
  - best possible standstill "Torque free"
  - best possible standstill "velocity command to zero with ramp and filter
  - power shutdown with fault
  - NC reaction with fault
  - E-Stop function
- Control loop settings
  - base load function
  - velocity mix factor
  - velocity feedforward
- Velocity control loop monitor
- Position control loop monitor
- Drive halt
- Drive-Controlled Homing
- Command "Set Absolute Measuring"
- Analog output
- Analog input
- Digital In- and Outputs
- Oscilloscope function
- Command "Detect marker position“

- Encoder emulation
  - absolute encoder emulation (SSI format)
  - incremental encoder emulation
- Command Positive stop drive procedure
- Command park axis

Main Spindle Function

- A change between four modes is possible
- Four switchable parameter blocks
- Diagnostic outputs for the main spindle messages
- Drive-guided spindle positioning
- Drive-guided oscillating
- Drive-guided gear transitions
- Drive-guided windings transition
- Switchable velocity limit values
- Switchable torque limit values
- Velocity command value switching for C-axis mode

Notes

2 Safety Instructions for Electrical Drives

2.1 Introduction

These instructions must be read and understood before the equipment is used to minimize the risk of personal injury and / or property damage. Follow these safety instructions at all times.

Do not attempt to install, use or service this equipment without first reading all documentation provided with the product. Please read and understand these safety instructions, and all user documentation of the equipment, prior to working with the equipment at any time. You must contact your local Indramat representative if you cannot locate the user documentation for your equipment. A listing of Indramat offices is supplied in the back of this manual. Request that your representative send this documentation immediately to the person or persons responsible for the safe operation of this equipment.

If the product is resold, rented and/or otherwise transferred or passed on to others, then these safety instructions must accompany it.

WARNING

Improper use of this equipment, failure to follow the attached safety instructions, or tampering with the product, including disabling of safety device, may result in personal injury, severe electrical shock, death, or property damage!

2.2 Hazards by improper use

DANGER

High voltage and high discharge current!

Danger to life, risk of severe electrical shock and risk of injury!

DANGER

Dangerous movements!

Danger to life and risk of injury or equipment damage by unintentional motor movements!

WARNING

High electrical voltages due to incorrect connections!

Danger to life, severe electrical shock and serious bodily injury!

WARNING

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!

CAUTION

Surface of machine housing could be extremely hot! Danger of injury! Danger of burns!

CAUTION

Risk of injury due to incorrect handling!

Bodily injury caused by crushing, shearing, cutting and thrusting movements!

CAUTION

Risk of injury due to incorrect handling of batteries!

2.3 General

- INDRAMAT GmbH is not liable for damages resulting from failure to observe the warnings given in these instructions.
- Order operating, maintenance and safety instructions in your language before starting up the machine. If your language is not available, then numerous other languages are. Please select one that you understand perfectly.
- Proper and correct transport, storage, assembly, and installation as well as care in operation and maintenance are prerequisites for optimal and safe operation of this equipment.
- Trained and qualified personnel in electrical equipment:

  Only trained and qualified personnel may work on this equipment or within its proximity. Personnel are qualified if they have sufficient knowledge of the assembly, installation, and operation of the product as well as an understanding of all warnings and precautionary measures noted in these instructions.

  Furthermore, they should be trained, instructed, and qualified to switch electrical circuits and equipment on and off, to ground them, and to mark them according to the requirements of safe work practices and common sense. They must have adequate safety equipment and be trained in first aid.
- Use only spare parts approved by the manufacturer.
- All safety regulations and requirements for the specific application must be followed as practiced in the country of use.
- The equipment is designed for installation on commercial machinery.
- Start-up is only permitted once it is sure that the machine in which the product is installed complies with the requirements of national safety regulations and safety specifications of the application.

  European countries: see Directive 89/392/EEC (Machine Guideline).
- Operation is only permitted if the national EMC regulations for the application are met.

  The instructions for installation in accordance with EMC requirements can be found in the INDRAMAT document "EMC in Drive and Control Systems”.

  The machine builder is responsible for compliance with the limiting values as prescribed in the national regulations and specific EMC regulations for the application.

  European countries: see Directive 89/336/EEC (EMC Guideline).

  U.S.A.: See National Electrical Codes (NEC), National Electrical Manufacturers Association (NEMA), and local building codes. The user of this equipment must consult the above noted items at all times.
- Technical data, connections, and operational conditions are specified in the product documentation and must be followed.

2.4 Protection against contact with electrical parts and not grounded enclosures

Note: This section pertains to equipment and drive components with voltages over 50 Volts.

Touching live parts with potentials of 50 volts and higher applied to them or touching not grounded enclosures can be dangerous and cause severe electrical shock. In order for electrical equipment to be operated, certain parts must have dangerous voltages applied to them.

DANGER

High Voltage!
Danger to life, severe electrical shock and risk of injury!

⇒ Only those trained and qualified to work with or on electrical equipment are permitted to operate, maintain and / or repair this equipment.

⇒ Follow general construction and safety regulations when working on electrical installations.

⇒ Before switching on power, the ground wire must be permanently connected to all electrical units according to the connection diagram.

⇒ At no time may electrical equipment be operated if the ground wire is not permanently connected, even for brief measurements or tests.

⇒ Before beginning any work, disconnect mains or the voltage source from the equipment. Lock the equipment against being switched on while work is being performed.

⇒ Wait five (5) minutes after switching off power to allow capacitors to discharge before beginning work. Measure the voltage on the capacitors before beginning work to make sure that the equipment is safe to touch.

⇒ Never touch the electrical connection points of a component while power is turned on.

⇒ Before switching the equipment on, install those covers and guards provided with the equipment to prevent contact with live parts. Before operating, cover and guard live parts properly so they cannot be touched.

⇒ A residual-current-operated protective device (r.c.d.) must not be used on an AC drive! Indirect contact must be prevented by other means, for example, by an overcurrent protective device.

European countries: according to EN 50178/ 1994.

⇒ Electrical components with exposed live parts must be installed in a control cabinet to prevent direct contact.

European countries: according to EN 50178/ 1994.

U.S.A: See National Electrical Codes (NEC), National Electrical Manufacturers Association (NEMA), and local building codes. The user of this equipment must consult the above noted items at all times.

DANGER

High housing voltage! High leakage current!
Danger to life and limb, danger of injury from electric shock!

⇒ Prior to powering up, connect the electrical equipment, the housing of all electrical units and motors to the protective conductor at the grounding points or ground them. This applies even to brief tests.

⇒ The protective conductor of the electrical equipment and units must always be connected to the supply network. Leakage current exceeds 3.5 mA.

⇒ Use at least a 10 mm^2 copper conductor cross section for this protective connection over its entire course!

⇒ Prior to startups, even for brief tests, always connect the protective conductor or connect with ground wire. High voltage levels can occur on the housing that could lead to severe electrical shock and personal injury.

European countries: EN 50178 / 1994, section 5.3.2.3.

USA: See National Electrical Codes (NEC), National Electrical Manufacturers Association (NEMA), and local building codes. The user of this equipment must consult the above noted items at all times.

2.5 Protection by protective low voltage (PELV) against electrical shock

All connections and terminals with voltages ranging between 5 and 50 volts on INDRAMAT products are protective low voltages designed in accordance with the following standards on contact safety:

- International: IEC 364-4-411.1.5
- EU countries: see EN 50178/1994, section 5.2.8.1.

WARNING

High electrical voltages due to incorrect connections!
Danger to life, severe electrical shock and/or serious bodily injury!

⇒ Only that equipment or those electrical components and cables may be connected to all terminals and clamps with 0 to 50 volts that are of the protective low voltage type (PELV = Protective Extra Low Voltage).

⇒ Only connect those voltages and electrical circuits that are safely isolated. Safe isolation is achieved, for example, with an isolating transformer, an optoelectronic coupler or when battery-operated.

2.6 Protection against dangerous movements

Dangerous movements can be caused when units have bad interfaces or motors are connected incorrectly.

There are various causes of dangerous movements:

- Improper or incorrect wiring or cable connections
- equipment is operated incorrectly
- probe parameters or encoder parameters are set incorrectly
- malfunctioning components
- errors in software or firmware

Dangerous movements can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation.

Although the monitoring circuits in the drive components make improper operation almost impossible, personnel safety requires that proper safety precautions be taken to minimize the risk of personal injury and/or property damage. This means that unexpected motion must be anticipated since safety monitoring built into the equipment might be defeated by incorrect wiring or other faults.

DANGER

Dangerous movements!
Danger to life and risk of injury or equipment damage!

⇒ In the drive component monitoring units, every effort is made to avoid the possibility of faulty operation in connected drives. Unintended machine motion or other malfunction is possible if monitoring units are disabled, bypassed or not activated.

⇒ Safe requirements of each individual drive application must be considered on a case-by-case basis by users and machine builders.

Avoiding accidents, personal injury and/or property damage:

⇒ Keep free and clear of the machine's range of motion and moving parts. Prevent people from accidentally entering the machine's range of movement:
- use protective fences
- use protective railings
- install protective coverings
- install light curtains / barriers

⇒ Fences should be strong enough to withstand maximum possible momentum.

⇒ Mount the Emergency Stop (E-stop) switch in the immediate reach of the operator. Verify that the emergency stop works before startup. Do not operate the machine if it is not working.

⇒ Isolate the drive power connection by means of an emergency stop circuit or use a start inhibit system to prevent unintentional start-up.

⇒ Make sure that the drives are brought to standstill before accessing or entering the danger zone.

⇒ Disconnect electrical power to the equipment using a master lock-out and secure against reconnection for:
- maintenance and repair work
- cleaning of equipment
- long periods of discontinued equipment use

⇒ Avoid operating high-frequency, remote control, and radio equipment near equipment electronics and supply leads. If use of such equipment cannot be avoided, verify the system and the plant for possible malfunctions at all possible positions of normal use before the first start-up. If necessary, perform a special Electromagnetic Compatibility (EMC) test on the plant.

2.7 Protection against magnetic and electromagnetic fields during operations and mounting

Magnetic and electromagnetic fields in the vicinity of current-carrying conductors and permanent motor magnets represent a serious health hazard to persons with heart pacemakers, metal implants and hearing aids.

WARNING

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electrical equipment!

⇒ Persons with pacemakers and metal implants are not permitted to have access to the following areas:
- Areas in which electrical equipment and parts are mounted, being operated or started up.
- Areas in which parts of motors with permanent magnets are being stored, repaired or mounted.

⇒ If it is necessary for a person with a pacemaker to enter into such an area, then a physician must be consulted prior to doing so.

⇒ Persons with metal implants or hearing aids must take care prior to entering into areas described above. It is assumed that metal implants or hearing aids will be affected by such areas: A physician must be consulted prior to working in and/or entering such areas.

2.8 Protection against contact with hot parts

CAUTION

Surface of machine housing could be extremely hot!
Danger of injury! Danger of burns!

⇒ Do not touch housing surface near the source of heat! Danger of burns!

⇒ Prior to accessing a unit, wait ten (10) minutes to allow the unit to cool off.

⇒ If hot parts of the equipment are touched, such as the unit housing in which heatsink and resistor are located, then this can cause burns.

2.9 Protection during handling and installation

All INDRAMAT products should be handled and assembled according to the instructions in the documentation.

CAUTION

Risk of injury due to incorrect handling!
Bodily injury caused by crushing, shearing, cutting, and thrusting movements!

⇒ Observe installation instructions and safety regulations before handling and working on the product.

⇒ Use suitable lifting or moving equipment during installation. Refer to the user manual for the product.

⇒ Take precautions to avoid pinching and crushing.

⇒ Only use suitable tools specified in the user manuals and use them according the instructions.

⇒ Use lifting devices and tools correctly and safely.

⇒ Wear appropriate protective clothing, e.g., protective goggles, safety shoes, protective gloves.

⇒ Never stand under suspended loads.

⇒ Clean up liquids form the floor to prevent personnel from slipping.

2.10 Battery safety

Batteries contain reactive chemicals. Incorrect handling can result in injury or equipment damage.

CAUTION

Risk of injury due to incorrect handling!

⇒ Do not attempt to reactivate dead batteries by heating or other methods (danger of explosion and corrosion).

⇒ Never charge batteries (danger from leakage and explosion).

⇒ Never throw batteries into a fire.

⇒ Do not take batteries apart.

⇒ Handle carefully. Incorrect extraction or installation of a battery can damage equipment.

Note: Environmental protection and disposal! The batteries contained in the product should be considered as hazardous material for land, air and sea transport in the sense of the legal requirements (Danger of explosion). Dispose of batteries separately from other refuse. Observe the legal requirements in the country of installation.

Notes

3 General Instructions for Installation

3.1 Definition of Terms, Introduction

It is helpful to explain the terms used in this document so that they will be better understood.

Parameter

Communication with the drive occurs (with a few exceptions) with the help of parameters. They can be used for

- Setting the configuration
- Parameterizing the control/drive settings
- Accessing control/drive functions and commands
- Cyclical or acyclical (depending on requirements) transmission of command and actual values

Note: All of the drive's operating data are identified by ID numbers.

Parameter block transitions

Specific parameter blocks have been are present at four different locations within the main spindle firmware. During operatioons, however, only one parameter block is active. During operation it is possible to change the active block. These "switchable parameters" are always identified with the **-x-** in their ID numbers. The non-switchable ones are identified with an **-0-**.

All those parameters in a switchable block in the drive are listed in **S-X-0219, IDN list of parameter blocks**.

The Data Status

Each parameter is provided with a data status, which can also be read. It serves the following purposes:

- Identifying the validity/invalidity of the parameter
- Contains the command acknowledgment if the parameter acts as a command

(see also Commands)

Paramter structure

There are seven different data block elements for each parameter. These can be read/write accessed either via a user data interface by a higher-ranking control or a parametrization surface.

Element No.:	Designation:	Remarks:
1	ID Number	Parameter identification
2	Name	can be changed in language selection
3	Attribute	contains data length, type and decimal places
4	Unit	can be changed in language selection
5	Minimum Input Value	contains the minimum input value of the operating data
6	Maximum Input Value	contains the maximum input value of the operating data
7	Operating Data	actual parameter value

Fig. 3-1: Data blocks or parameter structure

Write Accessibility

Only the operating data can be changed; all other elements can only be read.

The operating data can be write-protected either continuously or temporarily.

The write accessing of the operating data depends on the relevant communications phase.

Possible Error Messages when Reading and Writing Operating Data

Error:	Reason:
0x7002, data transmitted too short	
0x7003, data transmitted too long	
0x7004, Data not changeable	The operating data is write-protected
0x7005, Data currently write-protected	The operating data cannot be written to in this communication phase (see Supplement A:Parameterdescription)
0x7006, Data smaller than minimum value	The operating data is smaller than its minimal input value
0x7007, Data larger than maximum value	The operating data is larger than its maximum input value
0x7008, Data is not correct	The value could not be accepted as written because internal tests lead to a negative result
0x7009, data write protected with password	The parameter cannot be write accessed as the customer password was activated in parameter **S-0-0267, Password**. All parameters listed in S-0-0192, IDN-list of backup operation data are therefore locked.

Fig. 3-2: Error messages while reading/writing operating data

Data Storage

Non-Volatile Parameter Storage Registers

Various non-volatile parameter storage registers that buffer operating data are contained in the drive.

The operating data apply to:

- setting the configuration or
- parameterizing the control drive settings

Each time operating data is written to it is stored.

The following modules contain non-volatile memory:

- Control drive
- Motor feedback (optional)
- Programming module

Parameters Stored in the Digital Drive

All operating data that apply only to the drive controller and that cannot be changed by the user are stored in the digital drive. This consists of the following parameters:

- **S-0-0110, Amplifier Peak Current**
- **S-0-0112, Amplifier Nominal Current**
- **S-0-0140, Controller Type**
- **P-0-0518, Amplifier Nominal Current 2**
- **P-0-0519, Amplifier Peak Current 2**
- **P-0-4002, Current-Amplify-Trim Phase U**
- **P-0-4003, Current-Amplify-Trim Phase V**
- **P-0-4015, Intermediate Voltage**
- **P-0-4035, Trim-Current**

Parameter Storage in Motor Feedback

All motor-dependent parameters are stored in the motor feedback with MHD, MKD and MKE motors.

Additionally, parameters for the "load default" function and the motor feedback are stored here.

All parameters stored in the motor feedback data memory are there with both parameter block number 0 and 7.

In parameter block 7 (e.g., S-7-0100) the original data without write access are stored in the motor feedback data memory. These are copied after powering up into the parameters of parameter block 0 (e.g., S-0-0100) .

Note: The parameters of parameter block 0 take effect.

Parameters Stored in DSM Programming Module

All application parameters are stored in the programming module (control loop, mechanical system, interface parameters and so on).

All ID numbers backed up in this module are listed in parameter **S-0-0192, IDN-list of backup operation data**.

If the programming module is exchanged then these application parameters must be read out before hand so that they can be written into the new module after the exchange.

Note: By switching the programming module when devices are exchanged, the characteristics of the device that has been exchanged can be easily transferred to the new device.

Data Saving

To save the data of the axis, all important and changeable parameters of the axis are stored in the list **S-0-0192, IDN-List of backup operation data**. By saving the parameters listed there with the control or parametrization surface, you can obtain a complete data backup of this axis after the first setup (Backup&Restore-function).

Parameter Buffer Mode

The drive controller is capable of storing data that is transmitted via the user data channel (e.g., service channel) either temporarily or permanently.

The parameter **S-0-0269, Parameter buffer mode** determines what will be done with the parameters.

Basic parameter block

The drive parameters are set to default values at the factory. By executing the command **P-0-4094, C800 Command Base-parameter load** it is possible to reproduce this state at any time. The default parameter set is constructed so that

- all important monitoring functions are activated
- all optional drive functions are deactivated
- limit values for position are deactivated
- limit values for torque/force are set to high values and
- limit values for velocity and acceleration are set to lower values

The set mode is velocity control.

Note: The default parameter set does not guarantee a matching of the drive to the machine. The relevant settings must be made when first starting up the axis.

(See also: Basic drive functions and Commissioning Guidelines.)

Running the "load basic parameter block" function automatically

Drive firmware is stored on the programming module. In the event of a firmware exchange, the drive controller will detect this the next time the machine is switched on. In this case, the message "**PL**" appears on the 7-segment display. By pressing the "S1" key, the function default parameter set is activated.

Note: Any previous parameter settings are lost with the replacement of the firmware followed by "load base parameter block". If this is to be prevented, then the parmeters must be stored prior to an exchange and must be reloaded after exchange and load default parameter set .

Note: As long as the drive displays "**PL**" and the command is active, then communication via the serial interface (e.g.: with DriveTop) is not possible.

Password

All important axis-specific parameters are stored in the programming module. If, e.g., a controller is replaced because of a defect then the features can be transferred to the new controller by simply using the old module. The affected parameters are stored in **S-0-0192, IDN-List of backup operation data.** To secure these parameters against unwanted or non-authorized changes, the customer password can be activated.

Accessing the password function implements parameter **S-0-0267, Password**. At delivery, this customer password function is not active. In this case, all axis-specific parameters can be changed. The character sequence "007" in **S-0-0267, Password** is displayed. the customer password function is activated, so "***" isd displayed in **S-0-0267, Password**.

Length of password

At least three and no more than ten characters can be entered.

Activating and changing the customer password

To activate function customer password or change the passsword, it is necessary to input the following character sequence:

"old password", space, "new password", space, "new password"

in S-0-0267.

If function customer password is not activated, then the old password "007" must be used. If the function is active, then use the old customer password.

Deactivating the function customer password

"old customer password", space, "007", space, "007"

Lock parameter or make it write accessible

Upon activating function customer password, the parameters stored in **S-0-0192, IDN-list of backup operation data** after powering up, are write protected. They can be write accessed by entering the customer password in **S-0-0267, Password.**

By writing any character (minimum three, maximum ten) the parameters in **S-0-0192** can again be write accessed.

Note: Parameters stored in the motor feedback or drive controller data memory can generally not be changed by the user.

Commands

Commands are used to control complex functions in the drive. For example, the functions "Drive-Controlled Homing Procedure" or "Transistion Check for Communication Phase 4" are defined as commands.

Each command that is started must also be cleared.

A primary control can start, interrupt or erase a command.

Each command has a parameter with which the command can be controlled.

While a command is being executed, the diagnostic message "Cx" or "dx" appears in the H1 display, where x is the number of the command.

list of all procedure commands

All commands used are stored in parameter **S-0-0025, IDN-list of all procedure commands.**

Command Types

There are 3 command types.

- **Drive-Controlled Command**
  - Eventually leads to an automatic drive operation or motion
  - Can be started only when controller enable is set
  - Deactivates the active operating mode during its operation
- **Monitor Command**
  - Activates or deactivates monitors or features in the control drive
- **Management Command**
  - executes management tasks; is not interruptable

Command Input and Acknowledgment

Control and monitoring of command execution occurs via the command input and command acknowlegment. The command input tells the drive if the command should be started, interrupted or ended. The commanded value is the operating data of the applicable parameter. The command input value can be:

- not set and enabled (0)
- interrupted (1)
- set and enabled (3)

In the acknowledgement, the drive informs about the extent to which a command has been executed. This is then displayed in the data status of the command parameter.

Also see: "Data block structure".

Note: The command status can be obtained by conducting a write error on parameter element 1 (data status).

The condition can be:

- not set and enabled (0)
- in process (7)
- error, command execution not possible (0xF)
- command execution interrupted (5)
- command properly executed (3)

Change Bit Command

The Change Bit Command in the Drive Status Word helps the control recognize a change in the command acknowledgment by the drive. The bit is set by the drive if the command acknowledgment changes from the condition in process (7) to the condition error, command execution not possible (0xF) or command properly executed (3). The bit is cleared if the master clears the input (0).

The control system will recognize if the drive sets the Command Change Bit bit command. It can read the corresponding data status of the command or the command itself, which was set sometime but has not been cleared. The control system will recognize from this if the command ended with or without an error in the drive. Afterwards this command should be cleared by the control.

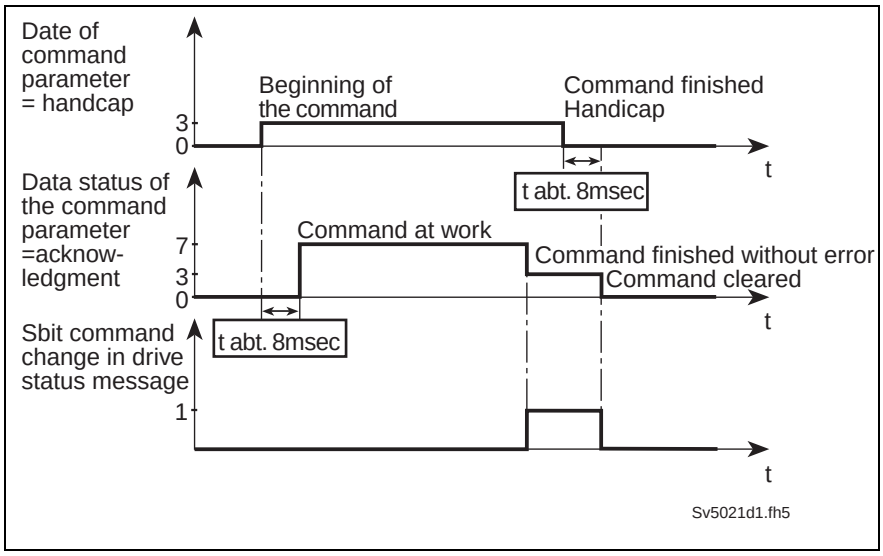


Fig. 3-3: Input, acknowledgment and Command Change Bit during proper execution

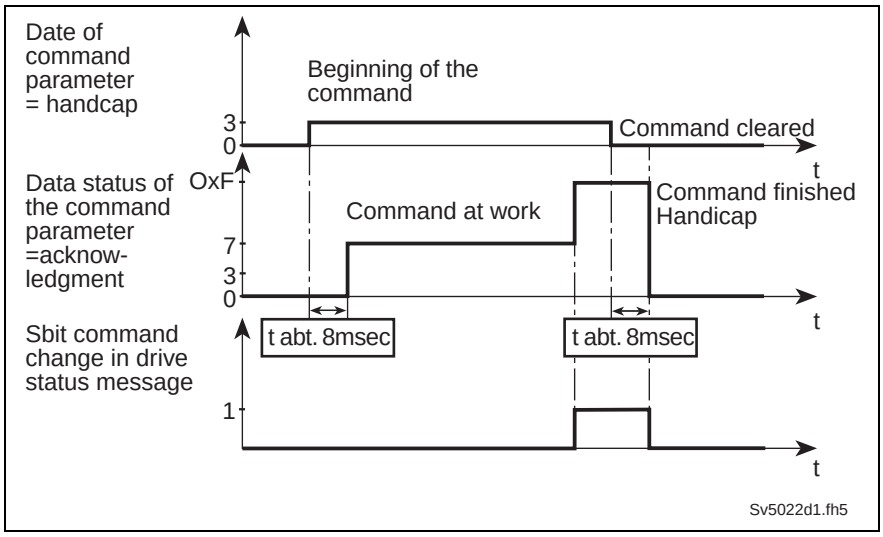


Fig. 3-4: Input, acknowledgment and Command Change Bit during erroneous execution

A delay time of up to 8ms can occur in the drive between receiving the command input and setting the command acknowledgment.

Operating Modes

Operating modes define which command values will be processed in which format, leading to the desired drive motion. They do not define how these command values will be transmitted from a control system to the drive.

One of the four selectable operating modes (S-0-0032…S-0-0035) is active when:

- the control and power supply is ready for operation and the controller enable signal is positive.
- The drive displays **"AF"** in the H1 display.

Note: All implemented operating modes are stored in parameter **S-0-0292, List of all operation modes**.

See also: "Operating modes"

Warnings

Warnings do not cause automatic shutdowns

Many areas are monitored in connection with operating modes and parameter settings. A warning will be generated if a state is detected that allows proper operation for the time being, but will eventually generate an error and thereby lead to a shutdown of the drive if this state continues.

Warning Classes

The warning class is evident from the diagnostic message

Warnings can be separated into 2 classes. They are differentiated by whether the drive executes an automatic reaction when the warning appears.

Warning Class:	Diagnostic Message:	Drive Response:
With drive response	E8xx	reacts on its own specifically in terms of any occurring warnings
Without drive response	E2xx	--

Fig. 3-5: Breakdown of the Warning Classes

Note: Warnings cannot be cleared externally.They pend until the conditions that lead to the warning are no longer present.

Error

Many areas are monitored in connection with operating modes and parameter settings. An error message is generated if a condition is encountered which no longer allows proper operation

Error Classes

The error class is evident from the diagnostic message.

Errors are separated into four different drive's error response:

Error Class:	Diagnostic Message:	Drive Response:
Fatal	F8xx	Torque free switching
Travel range	F6xx	Velocity command value switched to zero
Interface	F4xx	In accordance with best possible deceleration
Non-fatal	F2xx	In accordance with best possible deceleration

Fig. 3-6: Error class divisions

Drive's Error Response

If an error state is detected in the drive, the drive's error response will automatically be executed as long as the drive is in control. The H1 display flashes Fx / xx. The drive's reaction to interface and non-fatal errors can be parameterized with **P-0-0119, Best possible deceleration**. The drive switches to torque-free operation at the end of each error reaction.

Clearing Errors

Errors must be externally cleared.

Errors are not automatically cleared; they are cleared externally by:

- Initiating the command **S-0-0099, C500 Reset class 1 diagnostic or**
- Pressing the **"S1"** key.

With analog communications ist also possible to clear the error with the ext. input "CLR" of the DAE02.x card.

See also chapter: "Command Communications with Analog Interface".

If the error state is still present, then the error will be immediately detected again.

Clearing Errors When Controller Enable Is Set

If an error is discovered while operating with set controller enable, the drive will execute an error response. The drive automatically deactivates itself at the end of each error response; in other words, the power stage is switched off and the drive switches from an energized to a de-energized state.

To reactivate the drive:

- clear the error
- enter a 0-1 edge bit into the controller enable

Error memory

Error memory and operating hour counter

Once errors are cleared, they are stored in an error memory. The last 19 errors are stored there and the times they occurred.

Errors caused by a shutdown of the control voltage (e.g., **F870 +24Volt DC error**) are not stored in the error memory.

operating hour

Simultaneously, there is an operating hour counter for control and power sections of the drive controller. This function has the following parameters:

- **P-0-0190, Operating hours control section**
- **P-0-0191, Operating hours power section**
- **P-0-0192, Error recorder diagnosis number**
- **P-0-0193, Error recorder, operating hours control section**

IDN List of Parameters

There are parameters in the drive that, in turn, contain ID numbers of drive parameters. These support the handling of the drive parameters with parametrization programs (e.g., Drivetop, Serctop, and so on).

S-0-0017, IDN-list of all operation data

The ID numbers of all parameters in the drive are in this parameter. This list supports, for example, the parametrization program in the menu of which "All drive parameters" the information as to which ID number is in this drive firmware is stored.

S-0-0192, IDN-list of backup operation data

In parameter **S-0-0192, IDN-list of backup operation data** the ID numbers of all those parameters are stored, that are stored in the programming module. These are the parameters that are needed for a proper operation of the drive. The control or the parametrization program uses this ID number list to secure a copy of the drive parameters.

S-0-0021, IDN-list of invalid op. data for comm. Ph. 2

In the data of these ID lists, the drive enters the ID numbers out of parameter **S-0-0018, IDN-list of operation data for CP2** which are recognized as invalid in command **S-0-0127, C100 Communication phase 3 transition check**. Parameters are recognized as invalid if:

- their checksums, that are stored together with the operating data in a non-resident memory (programming module, amplifier or motor feedback data memory), do not fit to the operating data,
- their operating data is outside of the minimum/maximum input range or
- their operating data has violated the plausibility rules.

In any event, the parameters entered upon negative acknowledgement of command **S-0-0127, C100 Communication phase 3 transition check** in **S-0-0021, IDN-list of invalid op. data for comm. Ph. 2** must be corrected.

S-0-0022, IDN-list of invalid op. data for comm. Ph. 3

The drive enters the ID numbers out of parameter **S-0-0019, IDN-list of operation data for CP3** into the data of this ID list, which were detected in command **S-0-0128, C200 Communication phase 4 transition check** as invalid. Parameters are detected as invalid if:

- their checksum, stored together with the operating data in a non-resident memory (programming module, amplifier or motor feedback data memory) do not match the operating data,
- their operating data are outside of the minimum/maximum input limits or
- their operating data has violated the plausibility rules.

In any event, the parameters entered upon negative acknowledgement of command **S-0-0128, C100 Communication phase 4 transition check** in **S-0-0022, IDN-list of invalid op. data for comm. Ph. 3** must be corrected..

S-0-0018, IDN-list of operation data for CP2

The ID numbers that were checked for validity in command **S-0-0127, C100 Communication phase 3 transition check** are stored in **S-0-0018, IDN-list of operation data for CP2**.

S-0-0019, IDN-list of operation data for CP3

The ID numbers that were checked for validity in command **S-0-0128, C200 Communication phase 4 transition check** are stored in **S-0-0019, IDN-list of operation data for CP3**.

S-0-0025, IDN-list of all procedure commands

The ID numbers of all the commands in the drive are stored in this parameter.

3.2 Parametrization Mode - Operating Mode

Drive controllers with analog interface immediately go into operation mode once the control voltage of the controller is switched on.

The parametrization surfaces which communicate with the controller via the RS232/485 can switch between the parametrization mode and the operation mode as long as the drive is not in control.

The switch from parametrization to operating mode is controlled by start and end commands

- **S-0-0127, C100 Communication phase 3 transition check**
- **S-0-0128, C200 Communication phase 4 transition check**
- **P-0-4023, C400 Communication phase 2 transition**

If the drive reaches phase 4 without an error, then the message (H1) "**bb**" appears on the 7-segment display on the front of the drive amplifier. The corresponding diagnosis is: **A013 Ready for power on**

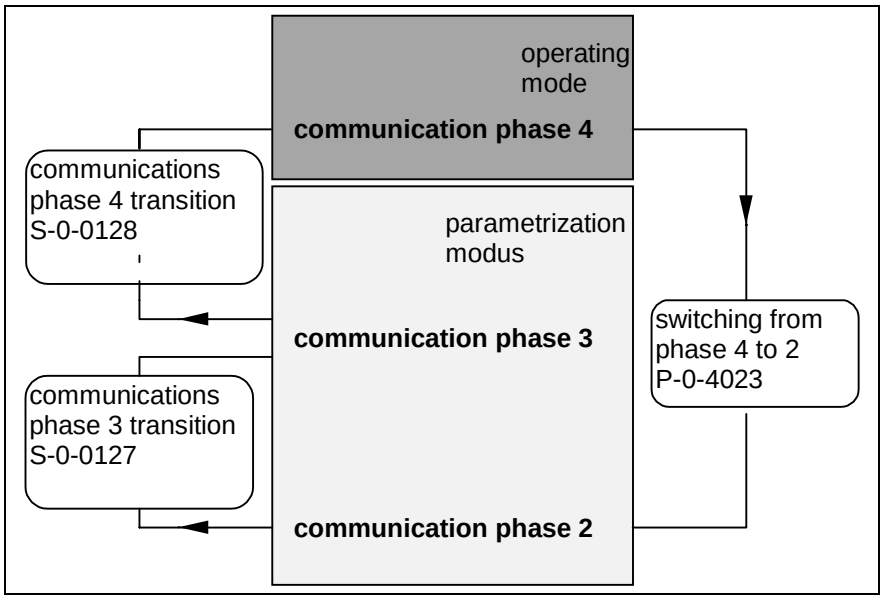


Fig. 3-7: The communications phases

Note: The evaluation of the measuring systems as well as the processing of the encoder emulations only takes place in operating mode. Switching from operating mode into parametrization mode means that these functions are no longer active. The switch into operating mode always starts a new initialization of all the functions within the drive.

Checks in the Transition Commands

To switch from communication phases 2 to 3 and 3 to 4, it is necessary to activate transition checks in the drive first. This includes a number of checks and parameter conversions.

The reasons for and assistance with transition command errors are specified in the diagnostics description.

S-0-0127, C100 Communication phase 3 transition check

It is checked in transition command C1 whether the values input for the parameters make any sense and whether analog interfaces DAE02.xM and parallel interface DEA4.xM have been inserted or not.

Check for correct plug-in card

If the right DAE card is not in, then error

- **C116 DAE not plugged in**

is generated

If DEA card is not in, then error

- **C119 DAE4 not plugged in**

is generated

S-0-0128, C200 Communication phase 4 transition check

During this command, the following checks are run.

Checking P-0-4014 for plausibility

If in parameter **P-0-4014, Motor type** 1 (MHD) or 5 (MKD/MKE) are selected and the motor feedback data memory has not found that type, then command error

- **C204 Motor type P-0-4014 incorrect**

is generated.

Checking validity

If a parameter needed for transition to phase 4 has never been written into, and its backup is faulty, then command error

- **C201 Invalid parameter(s) (->S-0-0022)**

is generated. The ID number of the faulty parameters are listed in

- **S-0-0022, IDN list of invalid op. data for comm. Ph. 3**

and are made valid by writing into.

Reading the controller memory

The drive controller reads the EEPROM memory, of the drive controller operating data. If an error occurs during this process, then command error:

- **C212 Invalid amplifier data (->S-0-0022)** appears**.**

The ID number of the faulty parameter is written in

- **S-0-0022, IDN-list of invalid op. data for comm. Ph. 3.**

Checking whether optional encoder is needed

Check whether a second encoder is present or not as per operating mode parameters S-0-0032 through 35 or homing parameter S-0-0147. If there is not one present (parameter **P-0-0075, Feedback 2 type** = 0) then the faulty operating mode parameters or homing parameters appear in:

- **S-0-0022, IDN-list of invalid op. data for comm. Ph. 3**

Command error

- **C210 Feedback 2 required (->S-0-0022)**.

Checking whether motor encoder is availablet

Check whether a motor encoder is available (**P-0-0074, Feedback type 1** = 0) and no "2" is entered in function parameter **P-0-0185, Function of encoder 2** for load-side motor encoder. If this is the case, then command error

- **C236 Feedback 1 required (P-0-0074)**

is generated.

Checking motor encoder settings

If the encoder parametrized in parameter **P-0-0074, Feedback type 1** is not available, or its data cannot be read, then this error message is generated

- **C217 Feedback1 data reading error**

Checking optional encoder settings

If the encoder interface selected in parameter **P-0-0075, Feedback type 2** is already occupied by the motor encoder, then this error message is generated:

- **C234 Encoder combination not possible**

generated.

If the needed plug-in card for the second encoder has not been inserted, then error message

- **C233 Encoder 2 interface not present**

is generated.

If a second encoder with feedback data memory is used but its data cannot be read, then error message

- **C218 error when reading data of encoder 2**

is generated. If parameter **P-0-0185, Funktion Encoder 2** "load-side motor encoder" is selected, but there is no rotary asynchronous motor, then error message

- **C235 Load-side motor encoder only with asynchronous motor**

is generated.

Reading out feedback data memory

The parameters stored in the memory of motors with feedback data memory are read. If an error occurs during this process, then command error

- **C211 Invalid feedback data (->S-0-0022)** is generated.

Checking maximum travel range

Check whether an internal position resolution has been set via parameter **S-0-0278, Maximum travel range** which guarantees the correct commutation of the motor. If not, then this command error appears:

- **C223 Input value for max. range too high.**

Checking scaling

Check internal ability to illustrate conversion factors from display format to an internal one and vice versa for scaling-dependent data. If an error occurs, then one of the following command errors can be generated:

- **C213 Position data scaling error**
- **C214 Velocity data scaling error**
- **C215 Acceleration data scaling error**
- **C216 Torque/force data scaling error**

Checking all parameters for extreme values and possible bit combinations

All parameters are checked for maintaining extreme values or permissible bit combinations. If an error occurs, then command error

- **C202 Parameter limit error (->S-0-0022)**

is generated. The ID number o the faulty parameter is listed in

- **S-0-0022, IDN-list of invalid op. data for comm. Ph. 3**

and must be corrected.

Checking modulo range

Checking whether an activated modulo scaling of the position from parameter **S-0-0103, Modulo value** is possible. If it is not, then command error

- **C227 Modulo range error**

is generated.

Checking the conversion of internal formats

The physical values of parameters (input format with decimal places and units) are converted to internal formats. This conversion is monitored. If incongruencies are detected during this process, then command error

- **C203 Parameter calculation error (->S-0-0022)**

is generated. The ID number of the faulty parameter is listed in

- **S-0-0022, IDN-list of invalid op. data for comm. Ph. 3**

and must be corrected.

Checking encoder initialization

Encoder initialization is listed. Errors can occur depending on encoder type (e.g., index length wrong in DSF feedback). Then one of the following command error

- **C220 Feedback 1 initializing error**
- **C221 Feedback 2 initializing error**

is generated.

Checking controller type

Depending on controller type, various internal settings are performed. If parameter **S-0-0140, Controller type** cannot be read, then command error

- **C228 Controller type S-0-0140 wrong**

is generated.

Überprüfung des Coprozessors

Wird die Initialisierung des Coprozessors nicht korrekt ausgeführt, wird die Diagnose

- **C225 Coprozessor nicht bereit zur Initialisierung**

is generated

Check parameter for automatic gear and windings switch

If the parameters for the automatic gear/windings switch is not correct, then the diagnosis

- **C230 Preselection of gearstages/Y-D-connection incomplete**

is generated.

Checking emulator hardware

If the initialization of the emulator hardware is not correctly performed, then the diagnosis

- **C231 Emulator not loadable**

is generated.

Absolute encoder montioring

If the actual position of an absolute encoder is outside of the range of the current actual position prior to the last shutdown of the unit +/- **P-0-0097, Absolute encoder monitoring window,** then error

- **F276 Absolute encoder outside of monitoring window**

is generated. The acknoweldgement of the transition command is not faulty in this case but rather the error must be cleared by executing command **S-0-0099, C500 Reset class 1 diagnostics**.

(Also see section: "Clearing error").

3.3 Commissioning Guidelines

For commissioning drive controllers, the parametrization interface DRIVETOP can be used.

The procedures for commissioning a drive controller entail 11 steps (IBS-1..11). The sequence is illustrated below.

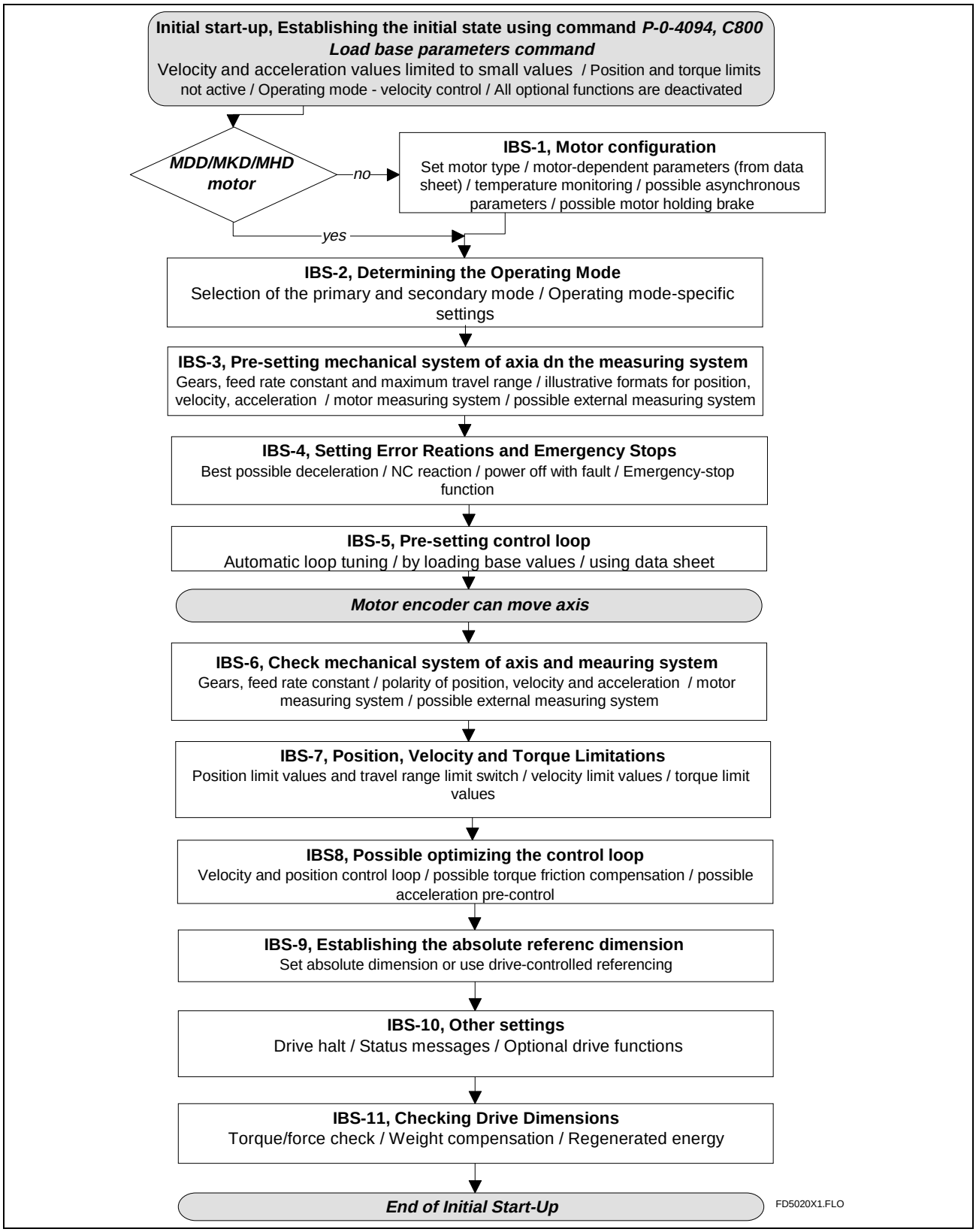

Initial start-up, Establishing the initial state using command P-0-4094, C800
Load base parameters command
Velocity and acceleration values limited to small values / Position and torque limits not active / Operating mode - velocity control / All optional functions are deactivated
MDD/MKD/MHD motor
no
IBS-1, Motor configuration
Set motor type / motor-dependent parameters (from data sheet) / temperature monitoring / possible asynchronous parameters / possible motor holding brake
yes
IBS-2, Determining the Operating Mode
Selection of the primary and secondary mode / Operating mode-specific settings
IBS-3, Pre-setting mechanical system of axia dn the measuring system
Gears, feed rate constant and maximum travel range / illustrative formats for position, velocity, acceleration / motor measuring system / possible external measuring system
IBS-4, Setting Error Reations and Emergency Stops
Best possible deceleration / NC reaction / power off with fault / Emergency-stop function
IBS-5, Pre-setting control loop
Automatic loop tuning / by loading base values / using data sheet
Motor encoder can move axis
IBS-6, Check mechanical system of axis and meauring system
Gears, feed rate constant / polarity of position, velocity and acceleration / motor measuring system / possible external measuring system
IBS-7, Position, Velocity and Torque Limitations
Position limit values and travel range limit switch / velocity limit values / torque limit values
IBS8, Possible optimizing the control loop
Velocity and position control loop / possible torque friction compensation / possible acceleration pre-control
IBS-9, Establishing the absolute referenc dimension
Set absolute dimension or use drive-controlled referencing
IBS-10, Other settings
Drive halt / Status messages / Optional drive functions
IBS-11, Checking Drive Dimensions
Torque/force check / Weight compensation / Regenerated energy
End of Initial Start-Up
FD5020X1.FLO

Fig. 3-8: Commissioning guidelines

IBS-1, Motor configuration

motor without data memory

These guidelines are needed in the case where the motor used does not have a motor feedback memory. It is necessary with these motors

- to enter the parameters for motor features (peak current, maximum velocity, etc.) using the data sheet or with DRIVETOP using data from the motor data bank.
- The parameters for the motor temperature warning and off thresholds must be parametrized as well
- and giving a motor holding brake, these must be properly set also.

motor with data memory

Those motors with data memory such as

- MHD and
- MKD motors

are recognized by the drive and motor parameters are automatically set.

(See also chapter: "Setting the motor type“.)

IBS-2, Determining the Operating Mode

In this step, the main and auxiliary operating modes are selected.

Operating-mode specific settings must be made.

In particular, necessary limit values, optionally usable filters and the available operating modes must be defined.

(Also see section: "Operating Modes")

IBS-3, Presetting the axis mechanics and measuring systems

In this step, the parameters needed for determining and processing position, velocity and acceleration data are set. These include the following parameters for the following settings:

- mechanical gear ratio between motor and load as well as any existing feedrate constants of the drive of linear slides
- scaling settings for showing position, velocity and acceleration parameters of the drive. This sets, for example, whether the data is motor shaft or load related and which LSB valence these have, e.g., position data with 0.001 degrees or 0.0001 inches and so on.
- Interfaces, rotational directions and the resoluton of the motor encoder, and where available, optional encoders.

(See also chapter : -"Physical Values Display Format"
-"Mechanical Transmission Elements" and
-"Setting the Measurement System").

IBS-4, Setting the error reactions and E-stop

In this step, the reaction of the drive in the event of an error is set as well as the triggering of the drive's own E-stop input. The following parametrizations must be performed:

- type and mode of error reactions in drive
- selection whether NC reaction in error case should happen
- selection whether and when the power supply is switched off and whether a package reaction is to be conducted
- Configuration of the E-stop input

(See also chapter: "Drive Error Reaction“)

IBS-5, Pre-setting Control Loop

The parameters for current, velocity and position control loops are set in this step. This is done either by:

- Execute command **S-0-0262, C700 Command basic load** or
- by inputting the controller values specified in the data sheet.

Setting the control loop in this way makes ensures a good level of quality for most applications. Should additional optimization of the control loop parameters become necessary (velocity and position control loop parameters, compensation functions and precontrol), then use commissioning step no. 8.

(See also chapter: "Control loop settings".)

IBS-6, Checking axis mechanics and measuring system

The presettings made in IBS 2 are checked here and modified, if necessary. This means that the axis must be moved by jogging. The following checks must be made:

- check the rotational direction of the motor encoder. With non-inverted position polaritiy (**S-0-0055, Position polarities** = 0), the values in parameter **S-0-0051, Position feedback 1 value** should have a rising order with a clockwise rotation of the motor. (This check need not be performed in MDD and MKD motors. If this is not the case, then bit 2 in **S-0-0277, Position feedback 1 type** must be inverted.
- By moving the axes and examining the position feedback value of the motor encoder in parameter **S-0-0051, Position feedback 1 value** it can be controlled whether a distance in this process is correctly displayed. If not, then the settings for mechanical gear ratio and encoder resolution must be checked.
- Given a second encoder, by moving the axis and examining the position feedback value of the external encoder in parameter **S-0-0053, Position feedback 2 value** it can be checked whether a distance is correctly displayed with this process. **S-0-0051, Position feedback 1 value** and **S-0-0053, Position feedback 2 value** should run parallel when jogging a specific path. If not, then check the settings in **P-0-0075, Feedback type 2, S-0-0117, Feedback 2 Resolution, S-0-0115, Position feedback 2 type** and **P-0-0185, Function of encoder 2.**

(See also chapter : -"Physical Values Display Format"
-"Mechanical Transmission Elements" and
-"Setting the Measurement System").

IBS-7, Limits for position, velocity and torque

In this step the limit values for the axis velocity and maximum drive torque/force are parametrized.

(See also chapter: -"Torque/force limiting",
-"Limiting velocity".)

IBS-8, Optimizing the control loop

This step is only necessary if the settings for velocity and position control loops in IBS 4 did not achieve the needed quality. As such, optimize the control behavior as follows:

- modify the parameter for velocity and position control loops
- possibly activate the acceleration pre-control
- possibly activate the friction torque compensation
- possibly activate the velocity mixture and
- possibly activate the notch filter.

(See also chapter: "Control loop settings“.)

IBS-9, Establishing absolute reference measuring

Here the absolute reference measuring is set in terms of the machine zero point of the position feedback value from motor encoder and possibly optional encoder. The position feedback values at first show any, not machine zero point related values. By conducting

- setting absolute measuring (with absolute encoders) or
- drive-controlled homing

the coordinate systems of the position encoder and the coordinate system of the machine are made congruent.

(See also chapter: -"Drive-controlled homing" and
-"Set Absolute Measuring")

IBS-10, Other settings

Here

- drive halt function is parametrized,
- the language selected,
- general status message settings and
- the optional drive function settings are conducted.

(See also chapter: -"Drive Halt"
-"S-0-0013, Class 3 diagnostics"
-"S-0-0182, Manufacturer class 3 diagnostics"
-"Optional Drive Functions"
-"Language Selection"

IBS-11,Controlling drive dimensions

The power-related drive checks are conducted here. It is checked whether the continuous and peak power of drive amplifier and motor meet the requirements. The following checks are conducted for this purpose:

- generated torque/force of motor is checked. At a constant speed 60% and in rapid traverse 75% of the continuous torque at standstill of the motor should not be exceeded
- during the acceleration phase 80% of the maximum torque of the motor/controller combination may not be exceeded
- the thermal load of the drive amplifier should equal a max. of 80%

(See also chapter: "Current Limit")

With vertical axis, the weight compensation must be set so that the current consumption with upwards and downwards motions of the axes have the same minimum value.

Check the regenerated peak power and regenerated continuous power.

3.4 Diagnostic Configurations

Overview of Diagnostic Configurations

The diagnostics are configured into 2 groups:

- options for recognizing the current operating states of the priority-dependent, drive-internal generation of diagnoses
- collective messages for diverse status messages

Additionally, there are parameters for all important operating data that can be transmitted both via the command communications (SERCOS, Profibus, ...) as well as the parametrization interface (RS-232/485 in the ASCII protocol or SIS serial Indramat protocol).

Drive-Internal Diagnostics

The current operating condition of the drive is evident by which errors, warnings, commands and drive stop signals are available and which operating mode is active. Whether the drive is in preparation for operation or in parameter mode also is displayed.

The current operating condition can be determined from

- the 2-part seven-segment display (H1 display)
- the diagnostic parameter **S-0-0095, Diagnostic Message**
- the parameter **S-0-0390, Diagnostic Message Number**
- the parameter **P-0-0009, Error Message Number**
- the parameter **S-0-0375, List of diagnostic numbers**

The current diagnostic message with the highest priority is always shown in the

- H1 display,
- **S-0-0095, Diagnostic Message** and
- **S-0-0390, Diagnostic Message Number**.

The parameter **P-0-0009, Error Message Number** will contain a value unequal to 0 if an error is present.

The last displayed diagnostic numbers are displayed in chronological order in parameter **S-0-0375, List of diagnostic numbers**.

An overview of all diagnostic messages can be found in the diagnostic description (Troubleshooting Guide).

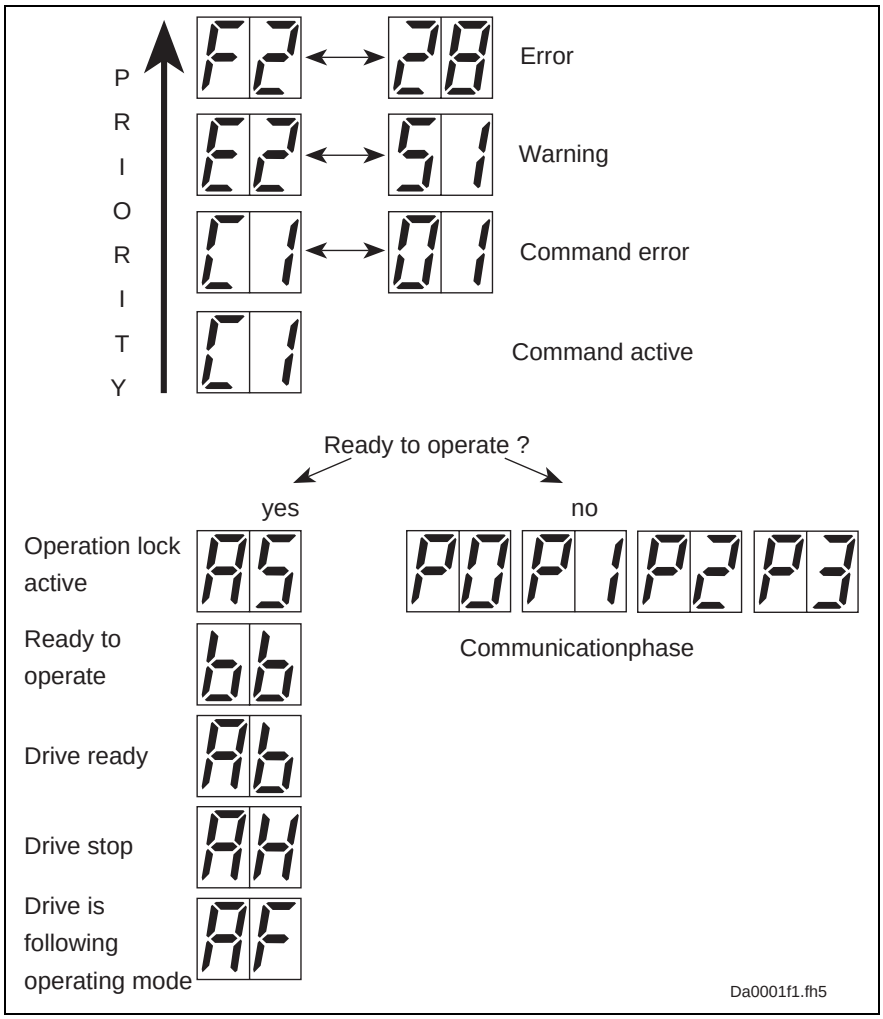


Fig. 3-9: Priority-dependent diagnostic formation on the H1 display

Diagnostic Message Composition

Each operating condition is designated with a diagnostic message, which consists of a

- diagnostic message number and a
- diagnostic text

For example, the diagnostic message for the non-fatal error "Excessive Control Deviation" is displayed as follows.

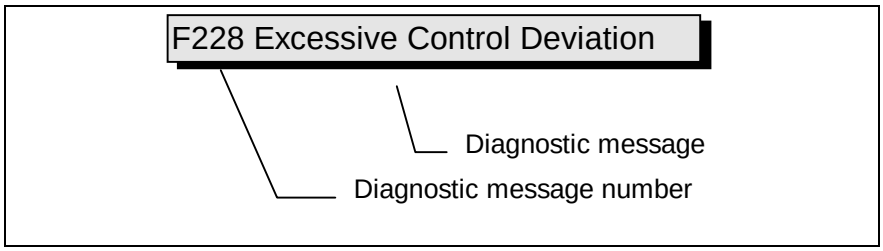


Fig. 3-10: Diagnostic message composition with a diagnostic message number and text

The H1 display alternates "F2" and "28". The diagnostic message number appears in hexadecimal format in the parameter **S-0-0390, Diagnostic Message Number**. In this example, this would be (0x)F228. The diagnostic message number and the diagnostic text are contained as a string "**F228 Excessive deviation**" in the parameter **S-0-0095, Diagnostic Message**.

H1-Display

The diagnostic number appears on the two-part seven-segment display. The form of the display emerges from the graphic "Priority-Dependent Display of the Diagnostic Message".

With the help of this display, it is possible to quickly determine the current operating status without using a communication interface.

The operating mode cannot be seen on the H1-Display.

If the drive follows the operating mode and no command was activated, then the symbol "AF" appears on the display.

Diagnostic Message

The diagnostic message contains the diagnostic number followed by the diagnostic text, as shown in the example, "Excessive Control Deviation." It can be read with the parameter **S-0-0095, Diagnostic Message** and directly displays the operation status on an operator interface.

The diagnostic message language can be changed.

Diagnostic Message Number

The diagnostic message number contains only the diagnostic number without the text. It can be read with the parameter **S-0-0390, Diagnostic Message Number** .

Error Number

The error number contains only the error number without the diagnostic text. It can be read with the parameter **P-0-0009, Error Message Number** and can indicate an error condition without a language barrier. This parameter contains a value unequal to "0" if an error is present in the drive.

An error is formed from the bottom 3 digits of the diagnostic number. For example, the error "**F228 Excessive deviation**" with the diagnostic message number "(0x)F228" would produce the error number "228."

List of diagnostic numbers

The 50 previously displayed diagnostic numbers are displayed in chronological order in parameter **S-0-0375, List of diagnostic numbers**. Every change in contents of **S-0-0390, Diagnostic message number** means that the old contents are transfered into **S-0-0375, List of diagnostic numbers**. If **S-0-0375, List of diagnostic numbers** is read, then the last replaced diagnostic number appears in the first element; the diagnotic number displayed penultimately is displayed in the second element and so on.

The following illustrated explains the relationship between **S-0-0375, List of diagnostic numbers** and **S-0-0390. Diagnostic message number** with the use of an example.

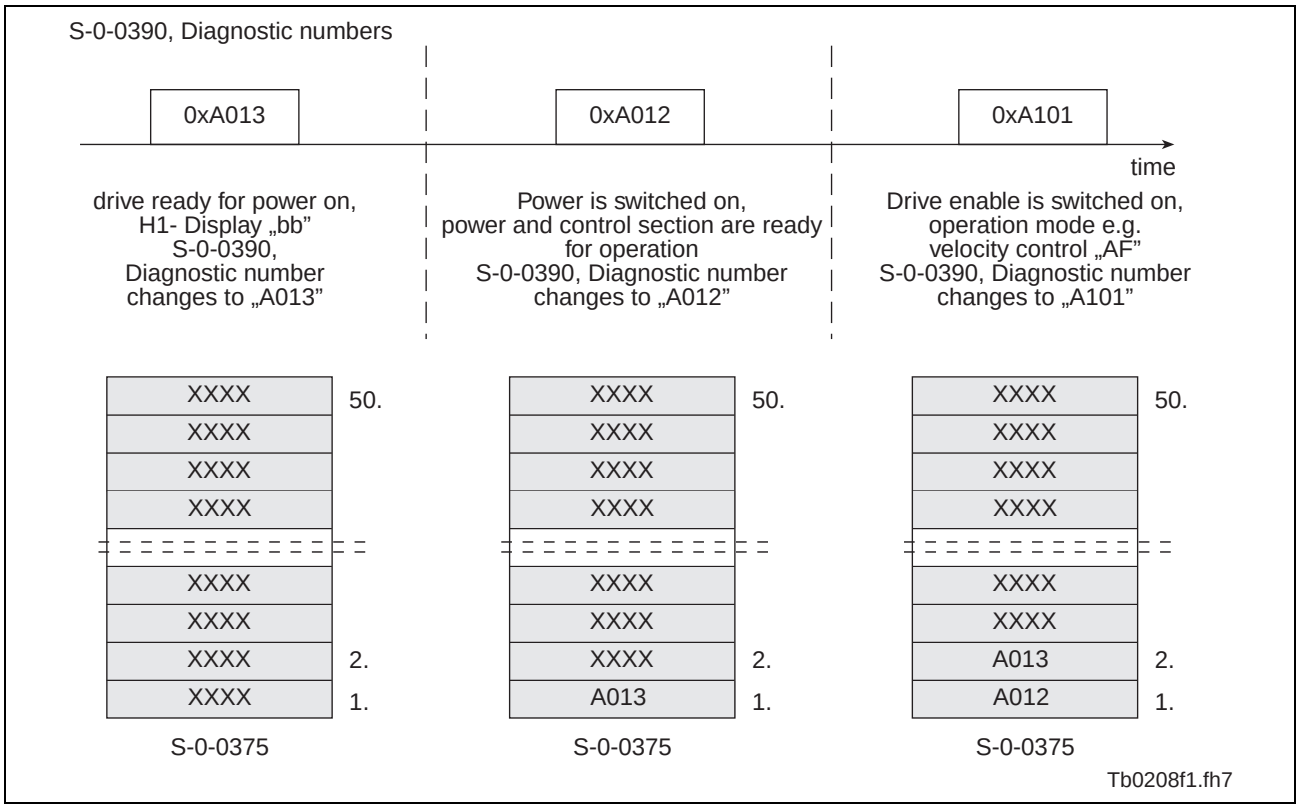

S-0-0390, Diagnostic numbers
0xA013
0xA012
0xA101
time
drive ready for power on, H1- Display „bb” S-0-0390, Diagnostic number changes to „A013”
Power is switched on, power and control section are ready for operation S-0-0390, Diagnostic number changes to „A012”
Drive enable is switched on, operation mode e.g. velocity control „AF” S-0-0390, Diagnostic number changes to „A101”
XXXX
50.
2.
1.
A013
A012
S-0-0375
Tb0208f1.fh7

Fig. 3-11: Example for generating **S-0-0375, List of diagnostic numbers**

Collection of Status

The class diagnostics parameters provide a collection of status and diagnostic information for displaying operating conditions. These parameters are:

- **S-0-0011, Class 1 Diagnostics**
- **S-0-0012, Class 2 Diagnostics**
- **S-0-0013, Class 3 Diagnostics**
- **S-0-0182, Manufacturer Class 3 Diagnostics**

S-0-0011, Class 1 diagnostics

Bits for the various errors are contained in parameter **S-0-0011, Class 1 Diagnostics**. A bit is set in this parameter in the case of a drive error. The bit "Drive Interlock, Error in Class 1 Diagnostics" is set simultaneously in the **drive status word**.

All bits in Class 1 Diagnostics can be cleared by executing the command **S-0-0099, C500 Reset class 1 diagnostic**. (see Clearing Errors)

The following bits are supported in Class 1 Diagnostics.

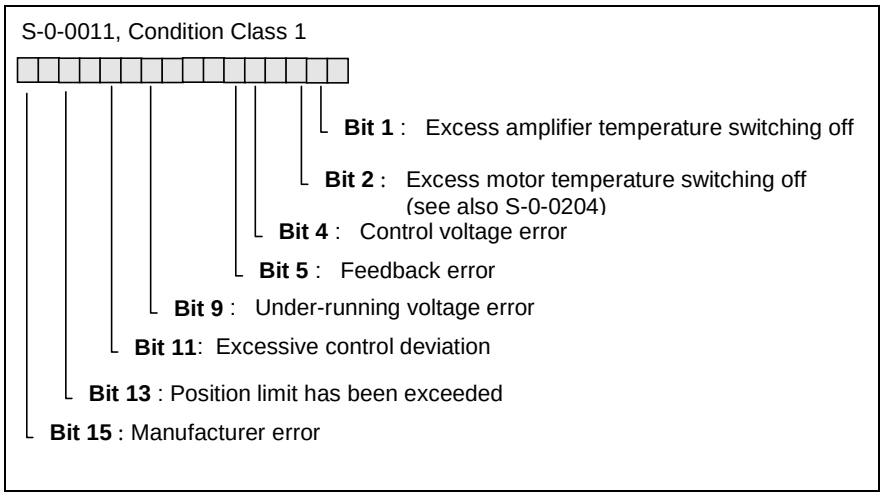

S-0-0011, Condition Class 1
Bit 1 : Excess amplifier temperature switching off
Bit 2 : Excess motor temperature switching off
(see also S-0-0204)
Bit 4 : Control voltage error
Bit 5 : Feedback error
Bit 9 : Under-running voltage error
Bit 11: Excessive control deviation
Bit 13 : Position limit has been exceeded
Bit 15 : Manufacturer error

Fig. 3-12: S-0-0011, Class 1 Diagnostics

S-0-0012, Class 2 diagnostics

Bits for various warnings are contained in this parameter. A bit is set in this parameter when a warning occurs.

The following bits are supported in class 2 diagnostics.

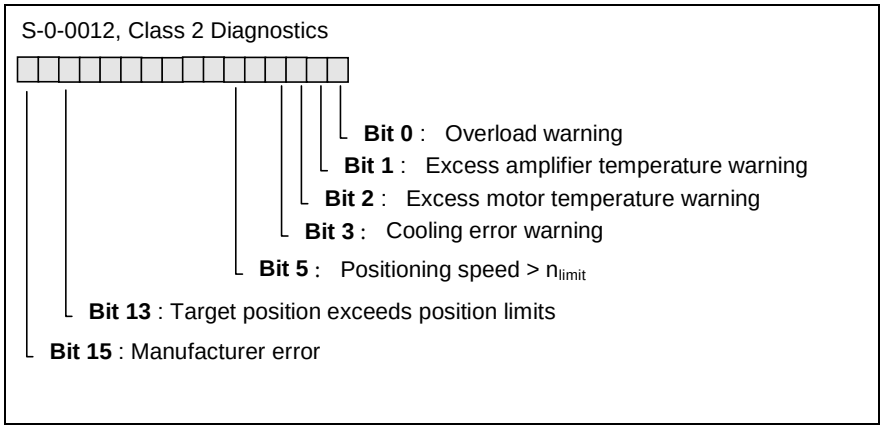

S-0-0012, Class 2 Diagnostics
Bit 0 : Overload warning
Bit 1 : Excess amplifier temperature warning
Bit 2 : Excess motor temperature warning
Bit 3 : Cooling error warning
Bit 5 : Positioning speed > n_{limit}
Bit 13 : Target position exceeds position limits
Bit 15 : Manufacturer error

Fig. 3-13: Composition of the parameter S-0-0012, Class 2 Diagnostics

Displaying a change in class 2 diagnostics

If the state of a bit in **S-0-0012, Class 2 diagnostics,** is changed, then this change is displayed without the help of output "TVW" on the plug-in module DAE02.1.

The output resets itself once no warning is pending.

The setting of the output can be masked with the help of parameter **S-0-0097, Mask class 2 diagnostic**.

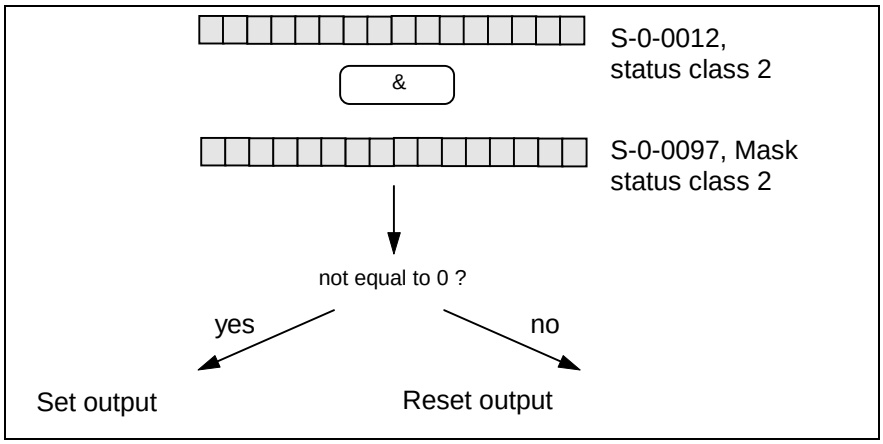


Fig. 3-14: Generating warning output TVW for status class 2

The presetting for parameter **S-0-0097, Mask class 2 diagnostics** is 0007h. This ensures that all overload warnings are standardly considered.

Also see section: "Command communications with analog interface".

S-0-0013, Class 3 diagnostics

Various operating status messages are stored here.

The following bits are supported in Class 3 Diagnostics.

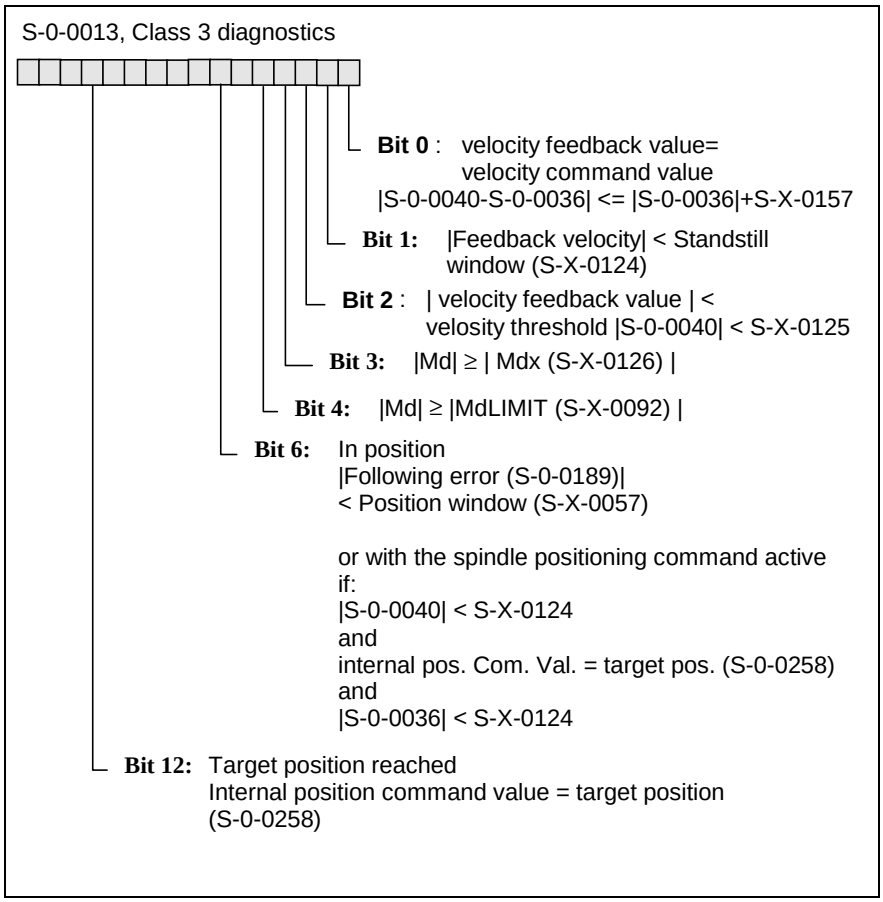

S-0-0013, Class 3 diagnostics
Bit 0 : velocity feedback value=
velocity command value
|S-0-0040-S-0-0036| <= |S-0-0036|+S-X-0157
Bit 1: |Feedback velocity| < Standstill
window (S-X-0124)
Bit 2 : | velocity feedback value | <
velosity threshold |S-0-0040| < S-X-0125
Bit 3: |Md| ≥ | Mdx (S-X-0126) |
Bit 4: |Md| ≥ |MdLIMIT (S-X-0092) |
Bit 6: In position
|Following error (S-0-0189)|
< Position window (S-X-0057)
or with the spindle positioning command active
if:
|S-0-0040| < S-X-0124
and
internal pos. Com. Val. = target pos. (S-0-0258)
and
|S-0-0036| < S-X-0124
Bit 12: Target position reached
Internal position command value = target position
(S-0-0258)

Fig. 3-15: Composition of S-0-0013, Class 3 Diagnostics

S-0-0182, Manufacturer class 3 diagnostics

The parameter **S-0-0182, Manufacturer Class 3 Diagnostics** contains the current operating status.

The following bits are supported in the Manufacturer Class 3 Diagnostics.

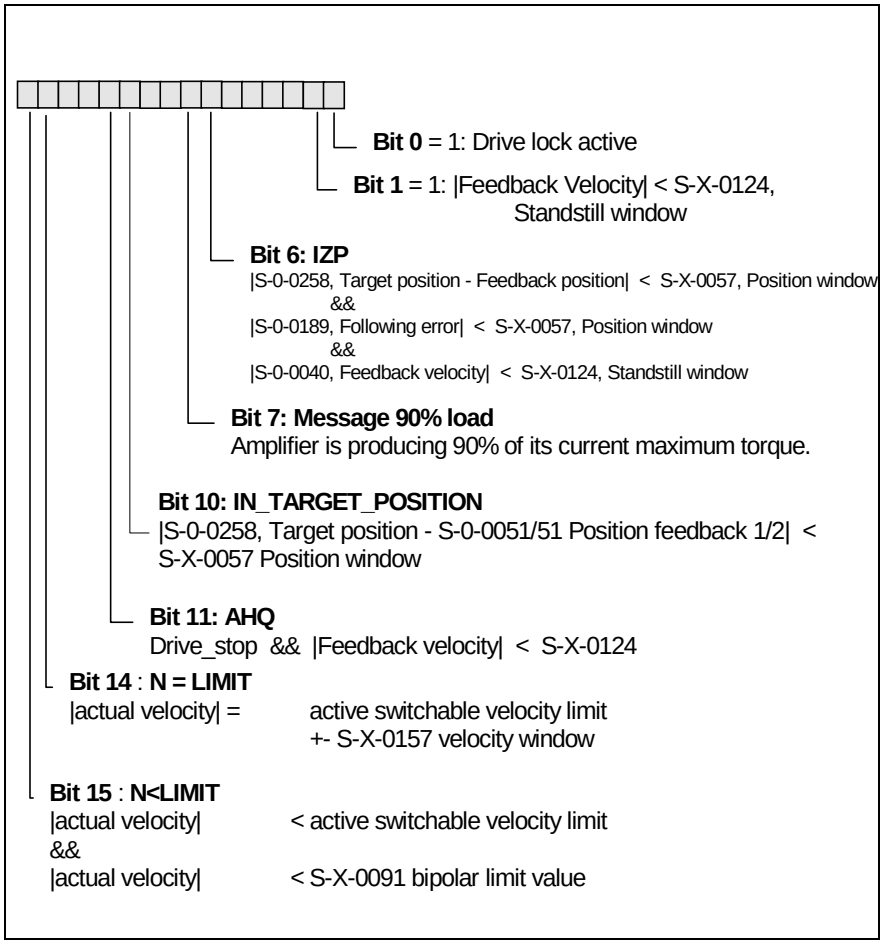

Bit 0 = 1: Drive lock active
Bit 1 = 1: |Feedback Velocity| < S-X-0124, Standstill window
Bit 6: IZP
|S-0-0258, Target position - Feedback position| < S-X-0057, Position window
&&
|S-0-0189, Following error| < S-X-0057, Position window
&&
|S-0-0040, Feedback velocity| < S-X-0124, Standstill window
Bit 7: Message 90% load
Amplifier is producing 90% of its current maximum torque.
Bit 10: IN_TARGET_POSITION
|S-0-0258, Target position - S-0-0051/51 Position feedback 1/2| < S-X-0057 Position window
Bit 11: AHQ
Drive_stop && |Feedback velocity| < S-X-0124
Bit 14 : N = LIMIT
|actual velocity| = active switchable velocity limit +- S-X-0157 velocity window
Bit 15 : N<LIMIT
|actual velocity| < active switchable velocity limit
&&
|actual velocity| < S-X-0091 bipolar limit value

Fig. 3-16: Composition of S-0-0182, Manufacturer Class 3 Diagnostics

3.5 Language Selection

With the parameter **S-0-0265, Language Selection** you can switch between several languages for

- Parameter names and units
- Diagnostic texts

The following languages are implemented:

Value of S-0-0265:	Language:
0	German
1	English
2	French
3	Spanish
4	Italian

Fig. 3-17: Language Selection

Notes

4 Command Communications with Analog Interface

4.1 Overview

With analog command communications, the drive enable signals, drive halt and clear errors are specified via a digital input. Diagnoses such as drive errors and warnings are output via digital outputs.

4.2 Pertinent Parameters

- **S-0-0134, Master control word**
- **S-0-0135, Drive status word**
- **S-0-0099, C500 Reset class 1 diagnostic**

4.3 How it works

Digital inputs

Digital inputs are read in every 250us and filtered with a digital filter so that the drive can detect a signal change within 2ms. Due to the digital processing, the signals are active in the drive within 10ms. The clear error input is read every 8mseconds.

The digital input signals are partially displaced in parameter **S-0-0134, Master control word**.

Input: Drive enable

The drive is activated via a 0-1 edge of the drive enable signal which is displayed in bit 15 of the master control word.

For the drive enable signal to be accepted, i.e., for the drive to switch from an off to an on state, the following conditions must be met:

- no drive error
- power section must be on

The drive displays **"Ab"** in this state. The diagnosis via parameter **S-0-0095, Diagnostic message** reads **A012 Control and power sections ready for operation**.

Once the drive enable is set, then the 7-segment display reads "**AF**". The diagnosis then shows the activated state, e.g., **A101 Drive in VELOCITY control**.

Acknowledge of the Drive Enable

The drive acknowledges the drive enable in the drive status word Bits 14 and 15 change there from "10" (control and power sections ready to operate, torque free) to "11" (in operation, with torque), if drive enable is activated and accepted.

The duration between setting and acknowledging the setting of the drive enable equals that time that the drive needs to establish complete operational readiness. For example, an asynchronous motor uses this time to magnetize.

When removing the drive enable, the drive conducts the reaction parametrized in **P-0-0119, Best possible deceleration**. Here as well, this takes a certain length of time between resetting and acknowledging the reset. This depends on

- Setting in parameter **P-0-0119, Best possible deceleration**
- whether there is a motor brake and its parmetrization
- the velocity of the axis at the time of drive enable reset

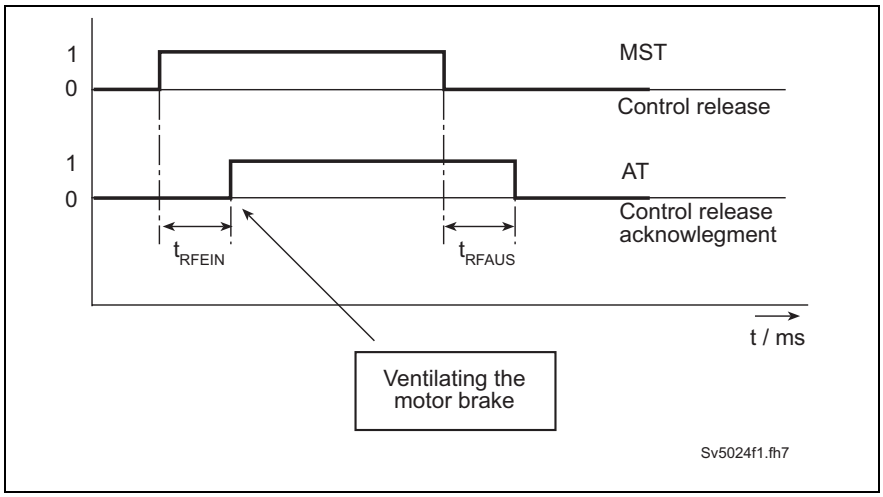


Fig. 4-1: Acknowledge drive enable

Typical values for t_{RFEIN} are about 10msec in synchronous and 300msec in asynchronous motors.

Note: During time t_{RFEIN} the drive should set the command value so that a command sdpeed of 0 results. Any cooling of an existing motor brake does not occur until after the point in time when drive enable is acknowledged (t_{RFEIN} + brake delay time).

Input: Drive halt,

The signal is condition-controlled and zero active, i.e., if the signal =0V , then the drive is in "Drive halt“. The input signal AH is shown in master control word bit 13.

See section: "Drive halt"

Input: Clear error

A 0-1 edge on error input CLR starts the clear error command. . By activating the clear error command, **all** drive errors are cleared.

Inputs: E1+/E1-/E2+/E2-

see section: "Analog inputs"

Inputs: FB+/FB-

The inputs FB+ and FB- have no function in the main spindle firmware.

Input: Stop

See section: "E-Stop function"

Digital outputs

Output: TVW

If a warning is generated in the drive, then output TVW is set.

See also section: "Displaying a diagnostics class 2 change".

4.4 ECODRIVE: Connecting the signals on the DKC

see also project planning manual

chapter: electrical connections - independent of the device type

4.5 DIAX-ANALOG: Connecting the signals on the controller

The connection of the referenced signals takes at the plug-in module DAE02.1.

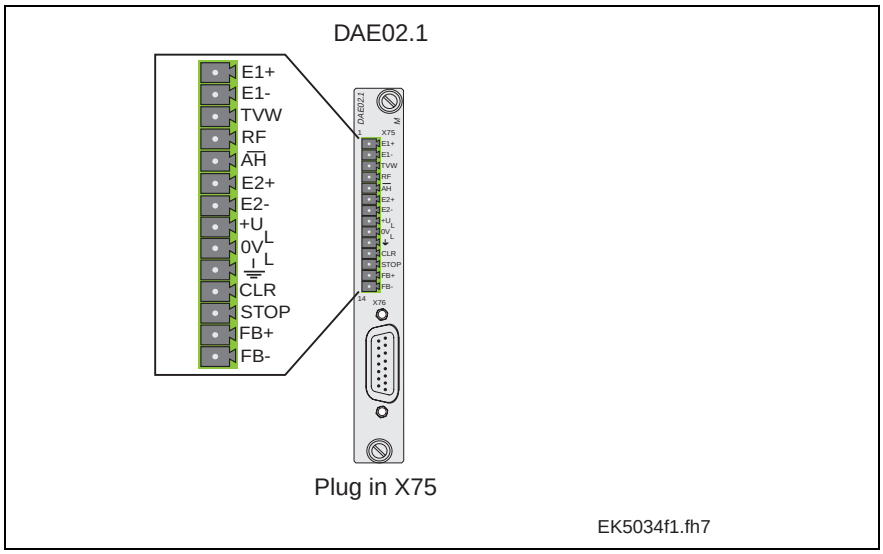


Fig. 4-2: Connecting the signals to the controller

Notes

5 Command Communication Using Parallel Interface

5.1 Overview

DIAX04 main spindle drives with analog interface must be outfitted with the DAE4 module as it implements the parallel interface.

5.2 Signal Overview

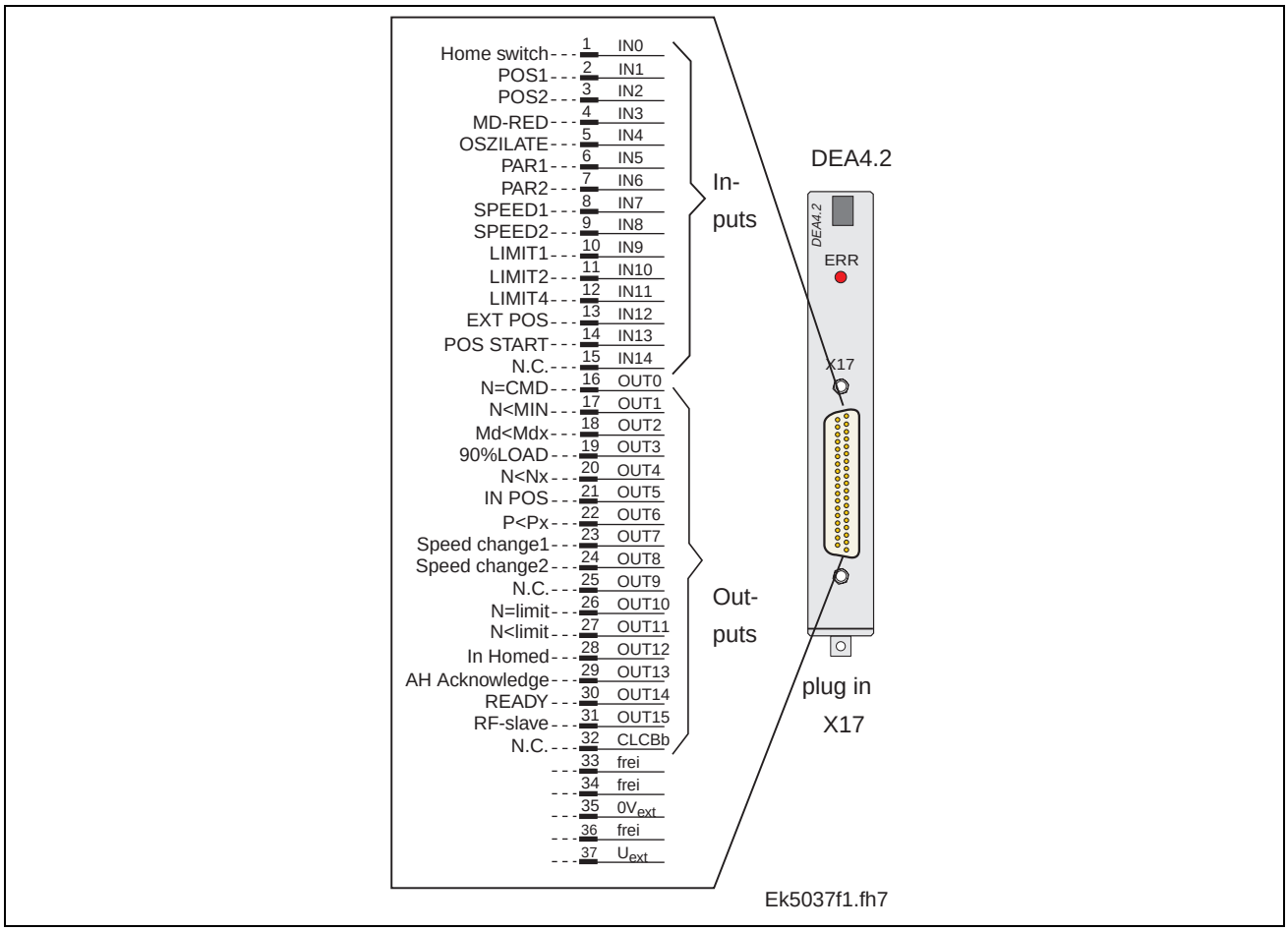


Fig. 5-3: I/O module DEA04.2M

5.3 Pertinent Parameters

- **P-0-0081, Parallel I/O output 1**
- **P-0-0082, Parallel I/O input 1**

5.4 How it works

Inputs

The inputs are filtered digitally. The read in cycle equals 500us. This means that filtering and scanning results in a reaction time between minimum 1.5 and maximum 4 ms.

The digital inputs of the parallel interface are shown on **P-0-0082, Parallel I/O input 1**.

The digital inputs are described below:

Input: Reference switch

Connection: X17 Pin 1

If positioning on a reference switch is to take place then it can be connected here.

See also section: "Spindle Positioning" or "Drive-Controlled Homing"

Inputs: POS1 and POS2

Connection: X17 Pin 2 and 3

These inputs are used to select one of four spindle positions or paths with drive-guided spindle positioning.

See also section: "Spindle Positioning"

Input: MD-RED

Connection: X17 Pin 4

This input can be used to active a parametrizable torque limit value.

See also section: "Current Limit"

Input: Oscillate

Connection: X17 Pin 5

This input starts command "Drive-guided oscillation".

See also section: "Drive-guided oscillation"

Inputs: PAR1 and PAR2

Connection: X17 Pin 6 and 7

The main spindle drive is equipped with four switchable parameter blocks. They determine which of the four parameter blocks is presently active.

See also section: "Parameter block transition"

Inputs: SPEED1 and SPEED2

Connection: X17 Pin 8 and 9

The main spindle drive can switch a two-stage gear when drive-guided. At these inputs, the gears signal to the drive which gear stage is presently engaged.

See also section: "Automatic gear transition"

Inputs: LIMIT1, LIMIT2, and LIMIT4

Connection: X17 Pin 10, 11 and 12

In the main spindle drive, these inputs can be used to select seven parametrizable maximum speeds.

See also section: "Limiting Velocity"

Input: EXT POS

Connection: X17 Pin 13

This input activates function "Switching the analog inputs for C-axis modes".

See also section: "Switching analog inputs for C-axis mode"

Input: POS START

Connection: X17 Pin 14

This input starts command "Spindel positionieren".

See also section: "Spindle Positioning"

Outputs

These outputs are used to transmit main spindle essages to connected controlers. The outputs are also displayed in parameter **P-0-0081, Parallel output 1**.

Output: N = CMD

Connection: X17 Pin 16

The voltage level is analog to bit #0 in **S-0-0013, Class 3 diagnostics**.

24 Volt	if $n_{ist} = n_{soll}$ The actual velocity value (S-0-0040) is then approximately within the velocity window (S-X-0157) around the velocity command value (S-0-0036).
0 Volt	other

See also section: "Collection of Status"

Output: N < MIN

Connection: X17 Pin 17

The voltage level is analog to bit #1 in **S-0-0013, Class 3 diagnostics**.

24 Volt	*With velocity control mode:* if $\|n_{ist}\| = 0$ The actual velocity value (S-0-0040) and command value (S-0-0036) are then smaller than the standstill window (S-X-0124) *With torque control mode:* if $\|n_{ist}\| = 0$ The actual velocity value (S-0-0040) is now smaller than the standstill window (S-X-0124)
0 Volt	other

See also section: "Collection of Status"

Output: Md < Mdx

Connection: X17 Pin 18

The voltage level is inverse to bit #3 in **S-0-0013, Class 3 diagnostics**.

24 Volt	if $\|M_d\| < M_{dx}$ The actual torque value M_d (S-0-0084) is now smaller than the torque threshold M_{dx} (S-X-0126)
0 Volt	other

See also section: "Collection of Status"

Output: /90% LOAD

Connection: X17 Pin 19

The voltage level is inverse to bit #7 in **S-0-0182, Manufacturer's Class 3 diagnostics**.

0 Volt	if the drive load exceeds 90% of the presently possible maximum load (dynamic current limit). This means there is less than 10% reserve.
24 Volt	other

See also section: "Collection of Status"

Output: N < Nx

Connection: X17 Pin 20

The voltage level is analog to bit #2 in **S-0-0013, Class 3 diagnostics**.

24 Volt	if $\|n_{ist}\|$ < S-X-0125 velocity threshold
0 Volt	other

See also section: "Collection of Status"

Output: IN POS

Connection: X17 Pin 21

The voltage level is analog to bit #6 in **S-0-0013, Class 3 diagnostics**.

Level with active position controller:

24 Volt	if: |Lag error (S-0-0189)| < Positioning window (S-X-0057)
0 Volt	other active position controller

Level with active command spindle positioning:

24 Volt	if spindle in position is standing still within the positioning window (S-X-0057)
0 Volt	otherwise with active spindle positioning command

Level other: 24 Volt

See also section: "Collection of Status"

Output: P < Px

Connection: X17 Pin 22

The voltage level is inverse to bit #7 in **S-0-0013, Class 3 diagnostics**.

24 Volt	if $\|P\| < P_x$ The output power P (S-0-0382) is smaller than the power threshold P_x (S-X-0158) (decel power also).
0 Volt	other

See also section: "Collection of Status"

Outputs: SPEED CHANGE 1 and SPEED CHANGE 2

Connection: X17 Pin 23 and 24

0 Volt oder 24 Volt	If the drive-guided gear or windings circuit is parametrized to be active, then these outputs are active in the gear/contractor switch.

See also section: "Automatic Gear Transition" or "Automatic Star/Delta Transition".

Output: N = LIMIT

Connection: X17 Pin 26

The voltage level is analog to bit #14 in **S-0-0182, Manufacturer's-Class 3 diagnostics**.

24 Volt	if a limit speed is selected with a LIMIT input and the motor speed lies within the speed window around this limit.
0 Volt	other.

See also section: "Limiting Velocity".

Output: N < LIMIT

Connection: X17 Pin 27

The voltage level is analog to bit #15 in **S-0-0182, Manufacturer's Class 3 diagnostics**.

0 Volt	if: 1. A limit speed selected with a LIMIT input and the motor speed has reached this limit or exceeded it or 2. the actual motor speed lies above the bipolar velocity limit vaue set in S-x-0091
24 Volt	other

See also section: "Limiting Velocity"

Output: In Reference

Connection: X17 Pin 28

The voltage level is analog to bit #0 in **S-0-0403, Status actual position value.**

24 Volt	The command "Drive-guided referencing" has been successfully executed and the coordinate system of the drive oriented towards the zero point of the machine.

g

0 Volt	other

See also: **S-0-0403, Position feedback value status**

Output: AH Quittung

Connection: X17 Pin 29

The voltage level is analog to bit #11 in **S-0-0182, Manufacturer's Class 3 diagnostics**.

24 Volt	if function "Drive halt" has been selected and the actual speed of the value in parameter **S-X-0124, Standstill window** is exceeded.
0 Volt	other

See also section: "Drive Halt"

Output: READY

Connection: X17 Pin 30

24 Volt	if: - no error in drive - power on - drive lock not activet
0 Volt	other

Output: RF-SLAVE

Connection: X17 Pin 31

24 Volt	if drive enable internally active RF-SLAVE in master/slave mode transmits the drive enable to slave. This ensures that in the event of an error, drive enable is simultaneously switched off in both master and slave.
0 Volt	other

6 Motor Configuration

6.1 Characteristics of the Different Motor Types

You can use the following motor types.

MHD
MKD/MKE
2AD/1MB/ADF
synchron kit motor

The individual motor types differ in the following points:

- Availability of data memory in the motor feedback for all motorspecific parameters
- Synchronous motor - Asynchronous motor
- Temperature check can be changed or not.
- Basic load (load default) possible or not
- Motor encoder interface setting can be changed or one setting only
- Start of commutation offset setting command possible or not
- Motor temperature sensor with PTC or NTC features

The individual motor types have the following characteristics

Motor type	Motor feedback data memory	Sync./Async.	Temp. check	Motor-encoder interface	Load default	Temp. Sensor
MHD/MKD/MKE	yes	synchronous	fixed	fixed (1)	possible	PTC
2AD/ADF	no	asynchronous	param.	param.	no	NTC
1MB	no	asynchronous	param.	param.	no	NTC
2AD with PTC	no	asynchronous	param.	param.	no	PTC
MBS	no	synchronous	param.	param.	no	PTC

Fig. 6-1: Characteristics of the Motor Types part 1

Motor type	Value for P-0-4014:	Remarks to setting the motor type:	
MHD/MKD/MKE	1	automatic detection	
2AD/ADF	2	must be set	
1MB	3	must be set	
2AD with PTC	6	must be set	
MBS	7	must be set	

Fig. 6-2: Characteristics of the Motor Types part 2

Motor Feedback-Data Memory

The data memory contains values for the following parameters:

- **S-0-0109, Motor Peak Current**
- **S-0-0111, Motor Current at Standstill**
- **S-0-0113, Maximum Motor Speed (nmax)**
- **S-0-0141, Motor Type**
- **P-0-0018, Number of Pole Pairs/Pole Pair**
- **P-0-0051, Torque/Force constant**
- **P-0-0510, Moment of inertia of the rotor**
- **P-0-0511, Brake current**

Motor types without motor feedback memory necessitate that these parameters are input with initial start-ups using the data sheet.

Synchronous-Asynchronous

Specific parameters are used only for synchronous motors, others only for asynchronous motors.

There are differences in the use and review of the parameters in the command **S-0-0128, C200 Communication phase 4 transition check**.

They are:

Synchronous:

- **P-0-4004, Magnetizing current** is set to 0
- **P-0-0508, Commutation offset** is checked for validity

Asynchronous:

- **P-0-4004, Magnetizing current** is initialized
- **P-0-0508, Commutation offset** is not checked

Temperature Monitoring

The switch-off limit for the motor temperature check is fixed at one point for MHD-, MKD, MKE motors.

The following parameters are used to monitor the motor temperature : :

S-0-0201, Motor warning temperature

S-0-0204, Motor shutdown temperature

For MHD, MKD and MKE motors, the parameter default values are:

S-0-0201, Motor warning temperature = 145,0°C

S-0-0204, Motor shutdown temperature = 155,0°C

Those default values can be used to help set the parameters for all other motor types. However, you must ensure that the switch-off limit is not set higher than the maximum permissible temperature of the motor.

The maximum input value for **S-0-0201, Motor warning temperature** is **S-0-0204, Motor shutdown temperature**.

If the temperature of the motor exceeds the value in **S-0-0201, Motor warning temperature**, the warning message **E251 Motor overtemp. prewarning** is generated.

If the temperature rises to the motor switch-off temperature, the error message **F219 Motor overtemp. shutdown** is displayed.

The minimum input value for **S-0-0204, Motor shutdown temperature** is **S-0-0201, Motor warning temperature**.

To display the motor temperature, the parameter **S-0-0383, Motor Temperature is used.**

The drive controller checks for proper functioning of the motor temperature monitoring system. If discrepancies occur (temperature drops below -10 degrees), the warning **E221 Warning Motor temp. surveillance defective** will be displayed for 10 seconds. After that, the error message **F221 Error Motor temp. surveillance defective** is generated.

Load Default Feature

MHD, MKD and MKE motors have a data memory in their feedbacks. The data memory contains a set of default control parameters in addition to all motor-dependent parameters.

These parameters are activated with the load default feature.

(See also "Load Default"feature.)

6.2 Setting the Motor Type

The setting of the motor type is done either:

- it depends on the used motor type.
- automatically by reading the motor feedback memory, or
- through the input of the parameter **P-0-4014, Motor type.**

The motor type should be set before start up because the motor type affects the drive functions:

See also Chapter: "Characteristics of the Different Motor Types"

Automatic Setting of the Motor Type for Motors with Feedback Memory

MHD, MKD and MKE motors have a motor feedback data memory, in which the motor type is stored (along with other information). The drive controller recognizes these motor types automatically and the following is executed:

- the value of the parameter **P-0-4014, Motor type** is set to its proper value and will be write-protected.
- the value of the parameter **P-0-0074, Feedback 1 type** is set to the defined value for the corresponding motor type.
- all bits except bit 6 are set for absolute/not-absolute to "0" in the parameter **S-0-0277, Position feedback 1 type**.

- all motor-dependent parameters are read out of the motor feedback data storage (see Motor Feedback-Data Memory). The parameter in the motor feedback memory are set with parameter block number 7. These are fetched and copied into the relevant parameters with parameter block number 0.
- the value of **S-0-0201, Motor warning temperature** will be set to 145,0°C, and the **S-0-0204, Motor shutdown temperature** will be set to 155,0°C.
- The value of **P-0-0525, Type of motor brake** is set to "0". The value of **P-0-0526, Brake control delay** is set to 150 ms.

This procedure is followed right after switching on as in the command **S-0-0128, C200 Communication phase 4 transition check**. The command error message, **C204 Motor type P-0-4014 incorrect**, will be generated in case an MHD, MKD and MKE motor is selected in **P-0-4014, Motor type** but the corresponding character sequence cannot be found in the motor feedback data memory.

Setting of the Motor Type through P-0-4014, Motor Type

For motors without motor feedback data memory, you have to set the motor type through **P-0-4014, Motor type**.

See also: Characteristics of the Different Motor Types

6.3 Asynchronous Motors

With DIAX-Firmware, you can use asynchronous motors in the entire rpm range, including constant power range.

In addition to the general motor parameters, you have to set the following asynchronous motor parameters for specific motors according to the Indramat default:

- **P-0-4004, Magnetizing current**
- **P-0-4012, Slip factor**
- **P-0-0530, Slip Increase**
- **P-0-0531, Stall Current Limit**
- **P-0-0533, Flux Loop Prop. Gain**
- **P-0-0534, Flux Loop Integral Action Time**
- **P-0-0535, Motor voltage at no load**
- **P-0-0536, Motor voltage max.**
- **P-0-0537, S1-Kink-Speed**

The user has two additional parameters to adjust the drive to his requirements.

- **P-X-0532, Premagnetization factor**
- **P-0-0538, Motor Function Parameter 1**

Basics for the Asynchronous Motor

Asynchronous motors are divided in three working ranges.

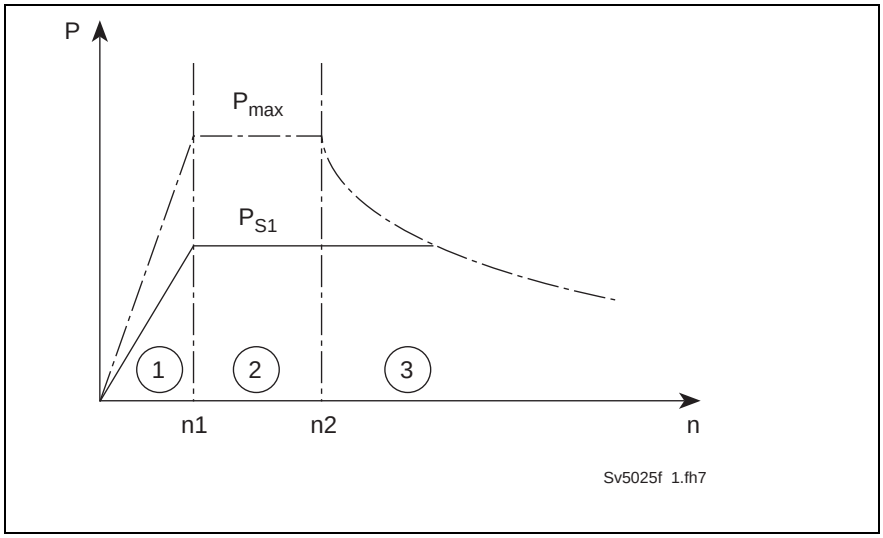


Fig. 6-3: Subsections of Work Ranges

Section 1:

The **Basic RPM Range** is defined by a constant torque and a fixed torque/force constant (parameter P-0-0051). In idle, the programmed magnetization current flows. The motor voltage is less than the maximum control output voltage. The corner RPM n1 is directly proportional to the DC bus voltage.

Section 2:

Range of Constant Power. The motor voltage is constant; the idle voltage and the corresponding magnetization and torque constants fall with increasing velocity. The slip is increased correspondingly.

The adjustment of magnetization current and slip is executed automatically by the vector control. The voltage is decreased during idle to the motor idle voltage (P-0-0535), and when fully in use it is increased to the maximum motor voltage (P-0-0536).

Section 3:

Range of decreasing Peak Power. The motor works at the sweep limit; an actual sweep is eliminated with the vector control. According to the parameter "sweep current limit," the peak current will be decreased enough so that the maximum power cannot be exceeded. An increase in current would lead only to wasted power and reduced shaft power. The peak power in range 3 is proportional to the square of the DC bus voltage. It is ensured that the maximum power always is reached for each DC bus voltage without parameter adjustment.

The power in range 3 cannot be extended through the use of more powerful controllers.

Torque Evaluation

100% torque refer to the motor's nominal torque according to the ID plate. Since the peak torque of asynchronous motors is limited to 2.5 times of the set value, you can reach torques up to 250%.

The significance of the torque values changes in the field-weakening range since the torque in the controller is set equal to the torque-producing current Iq. The torque, however, is the product of Iq and air gap induction, which decreases in the field-weakening range.

The assignment of the torque values in the different velocity ranges is displayed in the following picture:

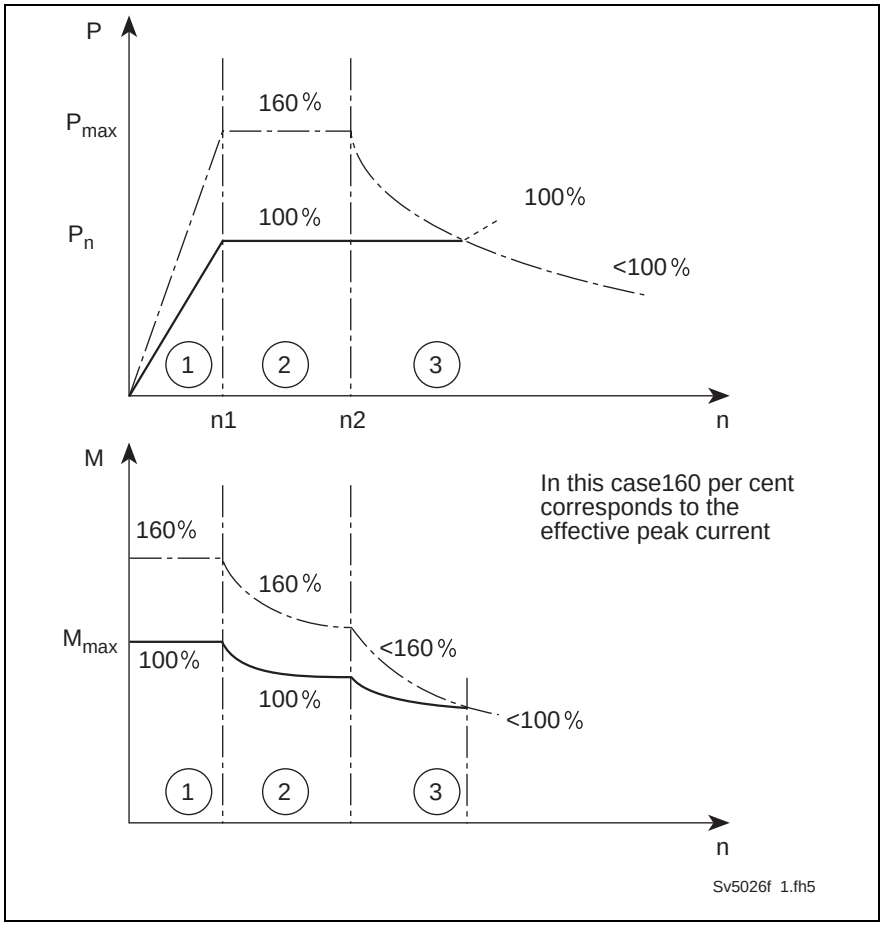


Fig. 6-4: Torque assignment

In range 1, the torque value is the actual torque. 100% = rated torque.

In range 2, the torque value is equal to the power.
100% = rated power according to selection list. (The rated power of the motor rating plate is not relevant here since it could relate to another DC bus voltage.)

Range 3 is similar to the evaluation of range 2, except that the preset torque decreases in correspondence to the increasing velocity of the peak power. For high velocity, the maximum torque value can drop below 100%.

In braking mode, you can reach 50% higher torque values in this range than in driving mode.

User-defined Settings for the Asynchronous Motor

To operate an asynchronous motor, you have to set the specific DIAX motor parameters in the controller. The parameters are stored on the programming module and are therefore transferable to another controller.

Note: Motor-specific parameters are used by all DIAX controls in the same manner. The resulting power characteristics curve depends on the current and especially on the DC bus voltage. Several additional parameters are available so the user can optimize the drive to his requirements.

Scaling Factor Pre-Magnetizing

With the pre-magnetizing scaling factor (P-X-0532), you can set the active magnetization current.

The following applies:

Effective magnetization current = magnetization voltage • scaling factor pre-magnetizing

Fig. 6-5: Calculation of the Effective Magnetization Current

If the pre-magnetizing scaling factor is at 100%, the motor is completely magnetized. There is a linear connection between set current and torque according to the torque constant P-0-0051. The torque builds up without delay. The drive has perfect servo properties.

The disadvantages are the high iron loss and the higher noise level in idle and in work mode, especially at 4kHz switching frequency, when the full magnetization current is flowing. For main spindle applications, it has proven successful to reduce the pre-magnetizing scaling factor to 50%. Through this procedure, the motor stays cooler and is not as noisy, while peak power is maintained. The extended start control time (only for jumps that exceed half the peak torque) and the missing linearity of torque and voltage do not distort the main spindle drives.

The qualitative connection between the pre-magnetizing scaling factor and drive behavior is displayed in the following graphic:

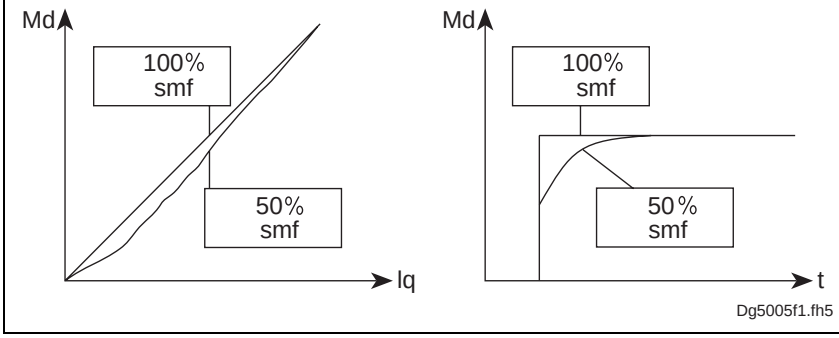


Fig. 6-6: Connection of pre-magnetizing scaling factor and drive behavior

The torque buildup is delayed by about 200ms during pre-magnetizing because the air gap range can only increase slowly in relation to the rotor time constant.

By reducing the pre-magnetizing scaling factor, you can achieve a better synchronous operation (in the one-thousandth degree range). This will reduce distorted torques, which result from saturation effects in the motor and from unavoidable deviations from an ideal sine form. To keep the torque linear in this case, the slip factor must be increased in the same measure at which the pre-magnetizing scaling factor was decreased. Warning: Torque constant, continual torque and peak torque are reduced!

Example: The synchronous operation should be improved in a servo drive. The pre-magnetizing scaling factor is set to 40%, and the slip factor is set to 2.5 times of the original value. The continual and peak torque decrease to approximately 40%. The reference speed increases to 2.5 times the velocity.

"S1-Operation" Function

By setting Bit 0 in the parameter "Motor function parameter," the function "S1-Operation" is activated.

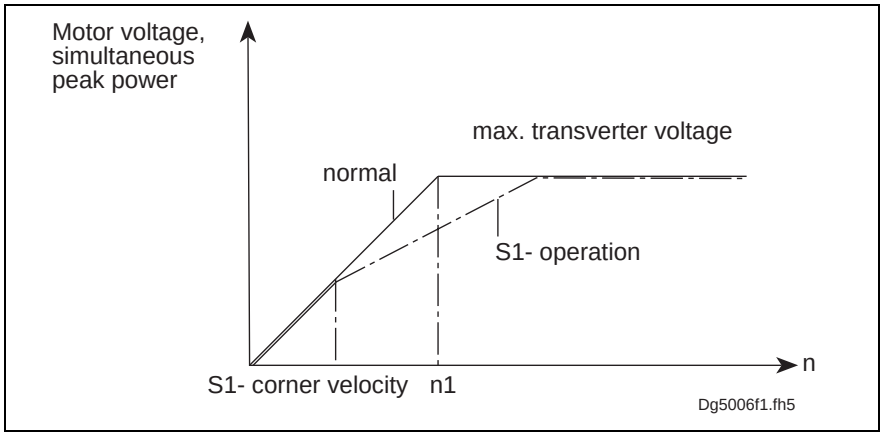


Fig. 6-7: Operating characteristics of the reference speed

Already from the S1 reference speed (corner velocity) (P-0-0537), a controlled field weakening prevents a continued increase in iron losses. If the motor-typical S1 kink speed drops drastically below the DC bus voltage and the motor-type dependent kink speed n1, then the iron loss in range S1 kink speed is kept constant until the output voltage is reached. The peak torque does decrease, but the motor losses are lower for resistances ≤ set rated loads. So activation of "S1-Operation" is advantageous for drives that are used with constant velocity in the medium RPM range, as would be the case for printing machines.

The S1 kink speed can be drastically below the electrical kink speed n1 especially with non-ventilated motors.

The S1 operation also can be used in connection with the reduced pre-magnetizing scaling factor.

Motor Function Parameter 1

Bit No.	Meaning
#0	= 0: no magnetizing current drop = 1: S1-magnetizing current drop active since the S1 kink speed

Fig. 6-8: Meaning P-0-0538, motor function parameter

6.4 Synchronous Motors

With this drive firmware it is possible to operate not only Indramat motors with housing such as

- MHD and
- MKD and MKE motors

but also rotary synchronous kit motors such as MBS. INDRAMAT motors with housing have a stator, rotor, bearings and feedback already built in. They have motor feedback memory in which

- motor parameters
- motor feedback parameters
- synchronous motor-specific parameters and
- default control parameters

are stored. This motors are recognized by the firmware and all settings automatically instituted. With these motors the alignment between the physical rotor positon and the position as supplied by the feedback has been performed at the factory prior to delivery. The resulting offset is stored in parameter **P-0-0508, Commutation offset** in the motor feedback memory (synchronous motor specific parameters).

INDRAMAT motors with housing configured at the factory

This motor can, therefore, immediately be operated without the need for motor-specific settings.

In the case of synchronous kit motors, additional settings must be made at the time of commissioning.

These are:

- motor parameters must be input and
- commutation offset must be determined.

To input the motor parameters, a data sheet from the motor manufacturer can be used. The commutation offset, on the other hand, is determined with the help of command **P-0-0524, Commutation adjustment command.**

WARNING

Error in the control of motor and moving elements.

⇒ Determining the commutation offset must be conducted each time after there has been a change in the mechanical relationship between motor feedback and motor. This is the case, for example, when the encoder or motor are replaced.

Determining the commutation offset

A condition for a chronologically constant torque of the synchronous machine is a fixed allocation between the stator current vector and the vector of the rotor flow. If the angle between these two vectors ($\gamma = 90°$), then the motor will generate its maximum torque. A synchronous motor is operated in this state.

In order to set the stator current vector correctly, the data on γ is needed. This generally necessitates a measuring system which can supply absolute information about this angle. Once the measuring system is mounted to the motor, only the absolute raw position is at first available. The difference between raw positon and absolute angle of rotor and stator field is designated the commutation offset. This is stored, if available, in the motor feedback data memory in parameter **P-7-0508, Commutation offset**.

If this parameter is to be determined, then the commutation setting function must be activated. The following two parameters are intended for this purpose:

- **P-0-0523, Commutation, probe value**
- **P-0-0524, Commutation adjustment command**

At the start of the **P-0-0524, Commutation adjustment command** it will determined automatically the commutation offset by switching defined stator current vector on with accompanying automatic measurement.

Note: To successfully conduct the command, the motor measuring system must be completely operable. The rotational direction of the measuring system must also be set! (See chapter: "Motor encoder“)

Determining the commutation offset in rotary synchronous motors (MBS)

With rotary synchronous motors, the commutation offset is determined by switching into a defined stator current vector. The rotor moves into a torque-free position. If the unadulterated position of this torque-free position is measured, then the commutation offset can be determined therefrom. This procedure is repeated several times at various positions. The mean value of these measurements equals the commutation offset.

The torque-free position cannot be reached due to extremely friction in the system, then command error

- **D301 Drive not ready for commutation command**

is generated.

The chronological sequece of stator current and relevant angle is illustrated below.

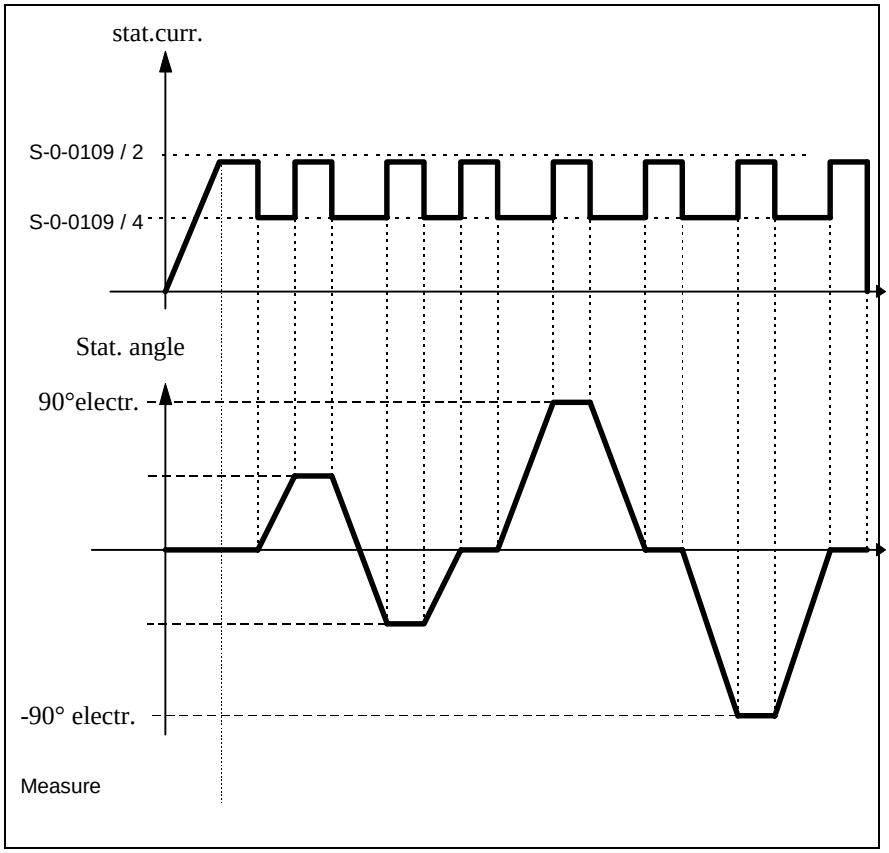


Fig. 6-9: Current and position upon execution of commutation offset determination in MBS motors

At command start, the drive must be in mode torque control. If not, then command error

- **D301 Drive not ready for commutation command**

is generated.

In order to be able to re-establish the relationship between motor encoder and rotor after power voltage is switched back on, only those motor encoders are permitted with have an absolute position of at least equal to one pole pair. The following input values for parameter **P-0-0074, Feedback type 1** are permitted:

Possible values for P-0-0074, Feedback type 1 with motor type MBS (rotary synchronous kit motor)	**Motor encoder interface**
1	digital servo feedback DSF or resolver with feedback data storage
8	Heidenhain encoder with Endat Interface
10	Resolver without feedback data storage *)
11	Resolver + incremental encoder with sine signals without feedback data memory *)

Fig. 6-10: Possible motor encoders with motor types "rotary synchronous kit“

Note: *) This motor encoder type has no feedback data memory. Commutation offset is therefore stored in parameter **P-0-0508, Commutation offset** in the programming module. Upon replacement of the module, the value of parameter **P-0-0508, Commutation offset** must be re-entered or the parameter must be stored and loaded out of the previous module.

Field Weakening for Synchronous Motors

The working range of synchronous motors is limited in conventional operations by rectifiers and their voltage. The motor reaches its maximum speed when its idle voltage reaches the level of the rectifier voltage.

With the field weaking range of synchronous motors it is now possible to operate motors outside of these limitations.

If the field weakening range is used for synchronous motors, then the following parameters must be set motor-specifically as specified by Indramat:

- **P-0-4004, Magnetizing current**
- **P-0-0531, Stall current limit**
- **P-0-0533, Flux loop prop. gain**
- **P-0-0534, Flux loop integral action time**
- **P-0-0535, Motor voltage at no load**
- **P-0-0536, Motor voltage max.**
- **P-0-0532, Premagnetization factor**
- **P-0-0538, Motor function parameter 1**

Note: The motor must be suited for operations in the field weakening range.

The field weakening function for synchronous motors is activated with parameter **P-0-0538, Motor function parameter 1**.

6.5 Motor Holding Brake

The drive controller of the DIAX series makes it possible to control a motor holding brake. It prevents unwanted axis movements when the drive enable signal is off.

Note: The holding brake is not a working brake. It wears down after about 20,000 motor revolutions if the brake is closed.

To set the motor holding brake, use parameters

- **P-0-0525, Type of motor brake**
- **P-0-0526, Brake control delay**
- **P-0-0511, Brake current**
- **P-0-0126, Maximum braking time**

The parameters for the motor holding brake are automatically set in motors with motor feedback data memory

These are automatically set in MHD, MKD and MKE motors. For all other motor types, the values which must be entered are specified in the data sheet of the motor or the motor brake.

Setting the Motor Brake Type

It it set in **P-0-0525, Type of motor brake** whether it is a self-holding (MHD, MKD or MKE motor) or a self-releasing brake.

It also differentiates between a servo brake or a main spindle brake.

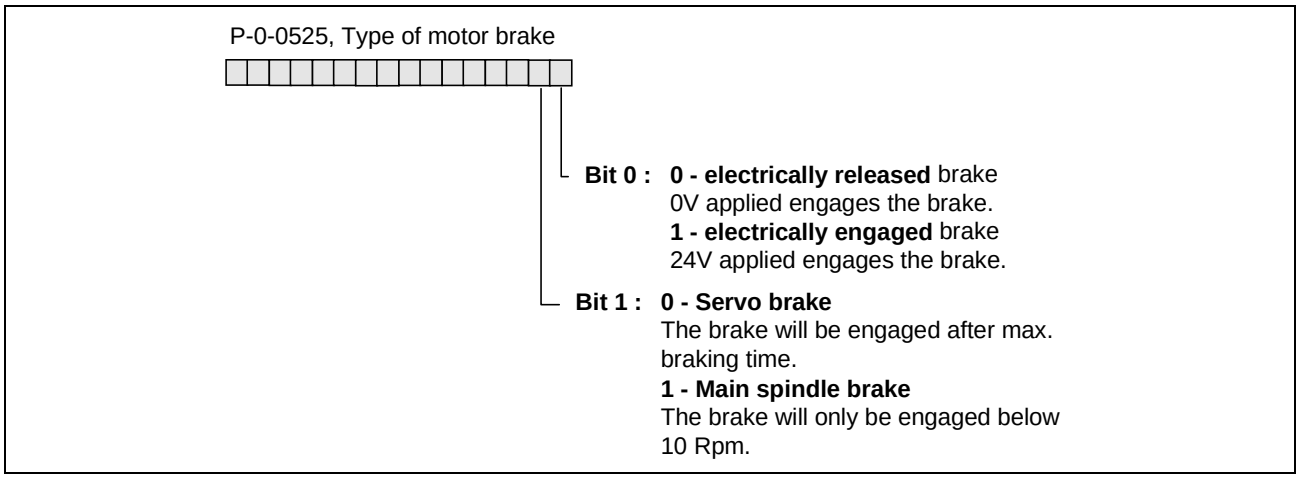

P-0-0525, Type of motor brake
Bit 0 : 0 - electrically released brake
0V applied engages the brake.
1 - electrically engaged brake
24V applied engages the brake.
Bit 1 : 0 - Servo brake
The brake will be engaged after max. braking time.
1 - Main spindle brake
The brake will only be engaged below 10 Rpm.

Fig. 6-11: Setting the motor brake type

Setting the Motor Brake Integral Action Time

In **P-0-0526, Brake control delay** it is necessary to set the time that the motor brake control needs to actually apply the brake. This keeps the drive from running against the brake.

A standard value for the direct connection of holding brakes of Indramat motors equals 100msec.

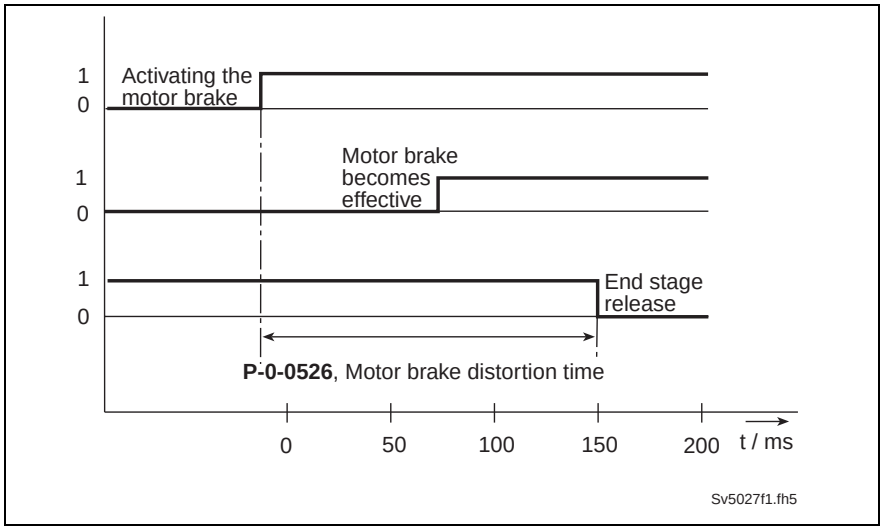


Fig. 6-12: Setting motor brake integral action time

Setting the Motor Brake Current

The motor holding brake is controlled by the drive via connector X6. The power supply of +24V for the brake control must thus be supplied from outside. If the brake is actuated (release with self-holding brake, power on with self-cooling brake), then the current flowing over the brake contact is monitored.

Note: The maximum output current for the control of the motor brake equals 2.0 A

The nominal value of the braking current is entered in **P-0-0511, Brake current**. If the actual braking current upon actuation of the brake lies outside of 0.4..1.6 * P-0-0511, **Brake current** then error message **F268 Brake error** is generated.

Brake current is deactivated upon input of 0 into **P-0-0511, Brake current**.

Connecting the Motor Holding Brake

The motor brake is connected at connector X6 on the drive controller.

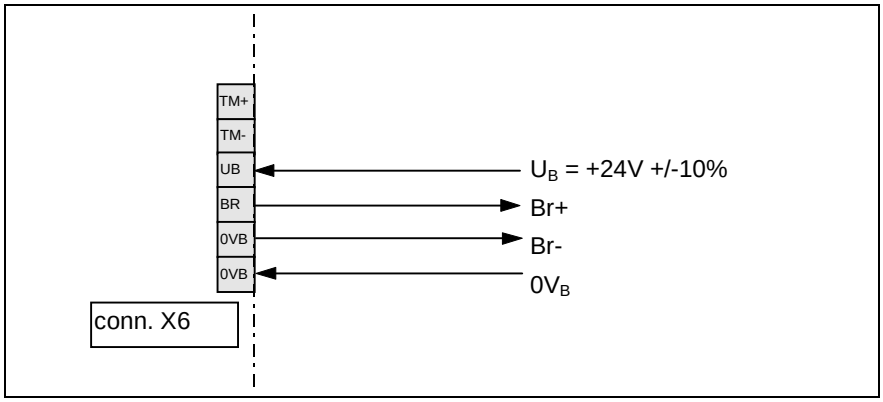


Fig. 6-13: Connecting the motor brake

The brake control requires an externa voltage supply of +24V. The brake is controlled via contacts Br+ and Br-.

Note: Monitoring the motor brake current without problems is necessary so that the 0V of the brake supply and the 0V of the drive controller is galvanically connected.

7 Operating Modes

7.1 Setting Operating Mode Parameters

Command communiations - analog interface

Within the context of the analog main spindle firmware it is possible to switch the active operating mode during operations. The mode is selected using the parameter block transition. The following interrelationships apply in this case:

Active parameter block	Active operating mode
0	as selected in **S-0-0032, Primary mode of operation**
1	as selected in **S-0-0033, Secondary operation mode 1**
2	as selected in **S-0-0034, Secondary operation mode 2**
3	as selected in **S-0-0035, Secondary operation mode 3**

Fig. 7-1: Relationship parameter block / active operating mode

All operating modes supported by the drive are listed in **S-0-0292, List of all operating modes**.

The codes used there are explained in the parameter descriptions of S-0-0032 through 35 (Main and auxiliary operating modes).

7.2 Programming / Detecting the Activated Operating Mode

Command communications - analog interface

If analog command communications is used, then bits 8 and 9 of the **S-0-0134, Master control word** display which mode is actually effective.

Bit 8 and 9 in master control word	Effective mode
0 0	Primary mode of operation
0 1	Secondary operation mode 1
1 0	Secondary operation mode 2
1 1	Secondary operation mode 3

Fig. 7-2: Programming/detecting active mode in master control word

7.3 Operating Mode: Torque Control

In operating mode **torque control** the drive is set with a torque command value. The diagnosis with an active mode reads **A100 Drive in TORQUE control** .

The command value is set in parameter **S-0-0080, Torque/Force command**.

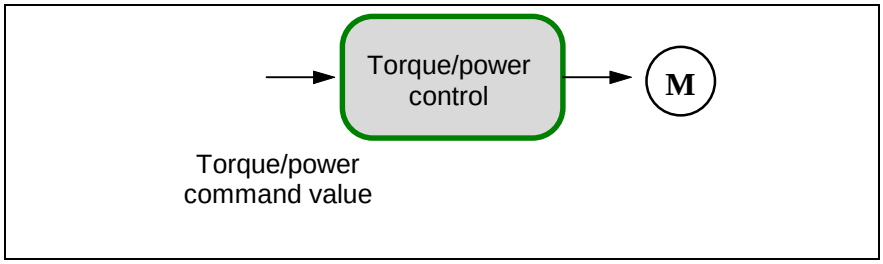


Fig. 7-3: Block diagram of torque control

Pertinent Parameters

- **S-0-0080, Torque/Force command**
- **P-0-4046, Active peak current**
- **P-X-0176, Torque/Force command smoothing time constant**

Torque Control

The command value in **S-0-0080, Torque/Force command** is limited with the effective peak current **P-0-4046, Active peak current**. This current is based on the current and torque limits.

(See section: "Current limits" and "Torque control").

The limited torque command value is filtered through a filter of the 1st order. The time constant of the filter is set in parameter **P-0-0176, Torque/Force command smoothing time constant**.

After limiting and filtering, the effective torque-generating command value is generated. It is the command value for the effective current control.

Using "Analog output of predefined signals“ the effective command current analog can be output.

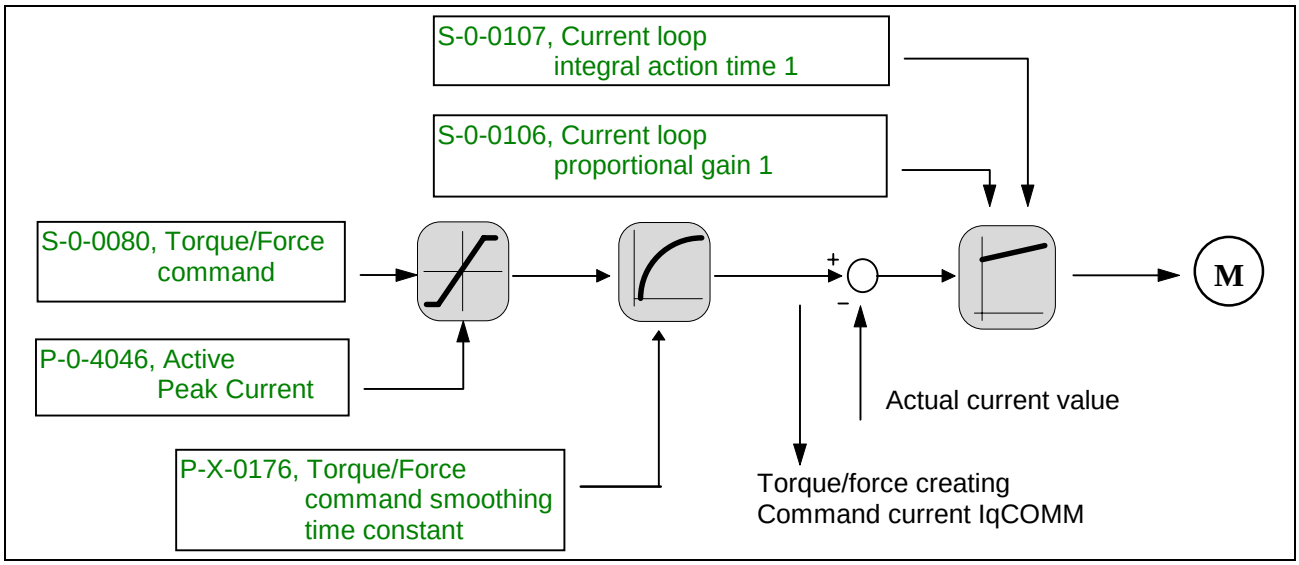


Fig. 7-4: Torque control

The torque command value can also be set analog. The signal selection of analog channel 1 in parameter **S-0-0080, Torque/Force command** must be parametrized first to do so.

Diagnostic Messages

Operating mode-specific monitors are

- Monitoring actual velocity for a 1.125 fold value of parameter **S-X-0091, Bipolar velocity limit value**.

(See section: "Limiting bipolar velocity limit value").

If this value is exceeded, then error **F879 Velocity limit S-0-0091 exceeded** is generated.

Torque Control with Analog Command Communications

To activate the operating mode in conjunction with analog command communications, note the following procedure:

- Select the mode with **S-0-0032, Primary mode of operation**
- Parametrize the analog channel **P-X-0213, Analog input 1, assignment to** parameter **S-0-0080, Torque command**
- Define the resolution with the help of **P-X-0214, Analog input 1, scaling per 10V full scale**.
- If necessary, set offset compensation via **P-0-0217, Analog input 1, offset**.

7.4 Mode: Velocity Control

A velocity value is commanded to the drive in the **Velocity Control** operating mode. The velocity command value is limited with ramps and a filter. The diagnostic message reads **A101 Drive in VELOCITY control** when the operating mode is active.

The command values are specified in the parameters **S-0-0036, Velocity command value** and **S-0-0037, Additive velocity command value**.

Pertinent Parameters

- **S-0-0037, Additive velocity command value**
- **S-0-0036, Velocity command value**
- **S-X-0091, Bipolar velocity limit value**
- **P-X-1201, Ramp 1 pitch**
- **P-X-1202, Final speed of ramp 1**
- **P-X-1203, Ramp 2 pitch**
- **P-X-1222, Velocity command filter**

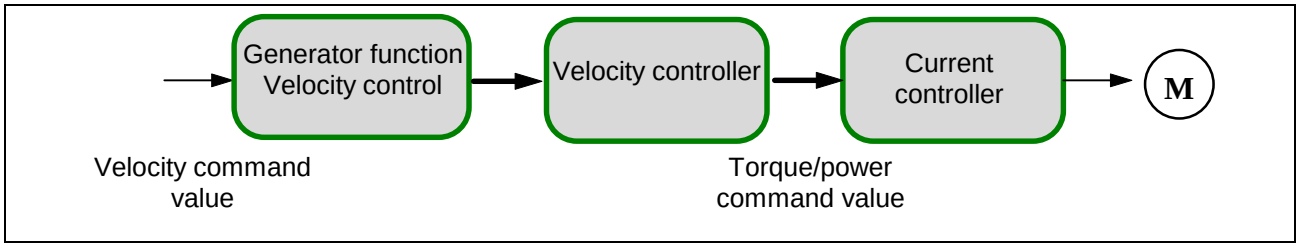


Fig. 7-5: Velocity control block diagram

Generator function Velocity control

The given **S-0-0036, Velocity command value** is limited to **S-X-0091, Bipolar velocity limit value**. Is the command value higher the message **E263 Velocity command value > limit S-0-0091** is shown. The command value is then accel limited via **P-X-1201, Ramp 1 pitch**. If command velocity exceeds the velocity in parameter **P-X-1202, Final speed of ramp 1,** then the command value is accel limited in terms of value **P-X-1203, Ramp 2 pitch**. The limit velocity command is jerk limited by means of a filter of the 1st order (**P-X-1222, Velocity command filter)**.

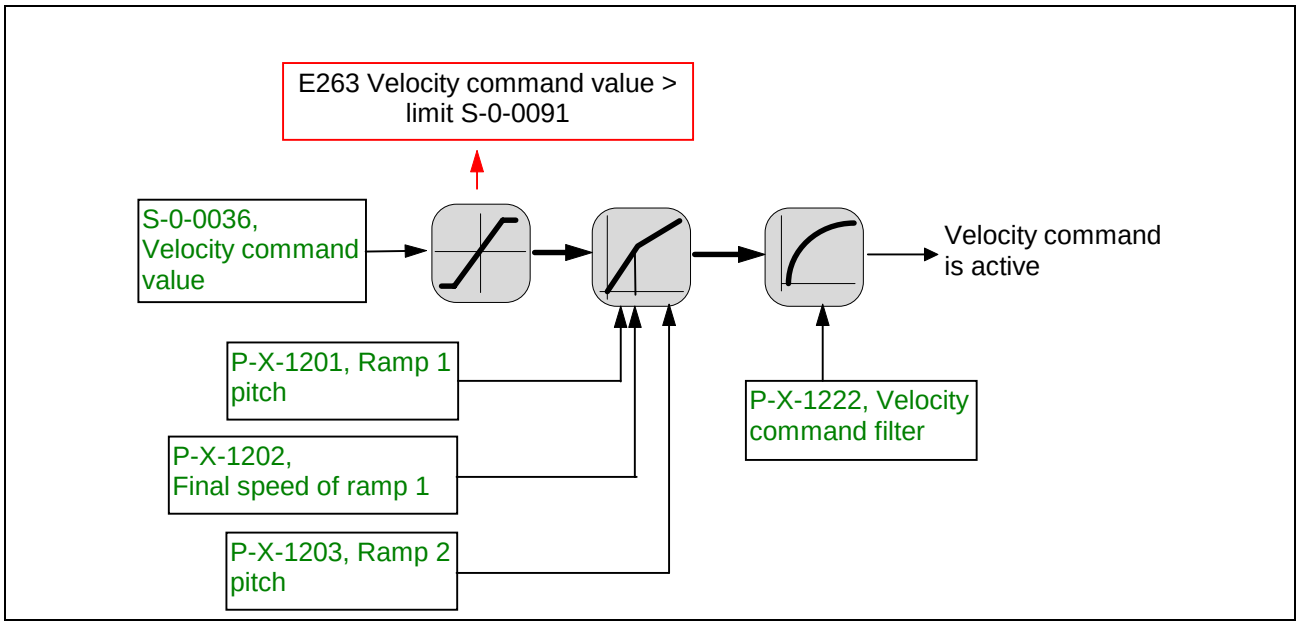

E263 Velocity command value > limit S-0-0091
S-0-0036, Velocity command value
Velocity command is active
P-X-1201, Ramp 1 pitch
P-X-1222, Velocity command filter
P-X-1202, Final speed of ramp 1
P-X-1203, Ramp 2 pitch

Fig. 7-6: Generator Function: Velocity Controller

See also chapter: "Velocity Controller"

See also chapter: "Current Controller".

Velocity Controller

The effective velocity command value is added with **S-0-0037, Additive velocity command value**.

Further he is limited to **S-X-0091, Bipolar velocity limit value**.

(See also chapter: "Limiting to Bipolar Velocity Limit Value")

If the resulting command value is at the limit, the warning **E259 Command velocity limit active** is displayed.

The velocity control difference is produced by including the actual velocity in the control loop. The raw feedback velocities of the motor and, if available, the external encoder can be combined into an effective actual velocity value. (See also chapter: " Setting the Velocity Mix Factor".)

Via **P-X-0004, Velocity loop smoothing time constant** you can limit the band of the control difference for the current controller.

This variable is then relayed to the current and toqrue limits.

(See also chapter: " Current Limit" and "Torque/Force Limitation".)

To filter mechanical resonance frequencies, a notch filter can be applied to this torque/force command value. Using parameter **P-X-0180, Rejection frequency velocity loop** and **P-X-0181, Rejection bandwidth velocity loop** the frequency range which must be suppressed and be parametrized.

(See also "Setting the Velocity Controller".)

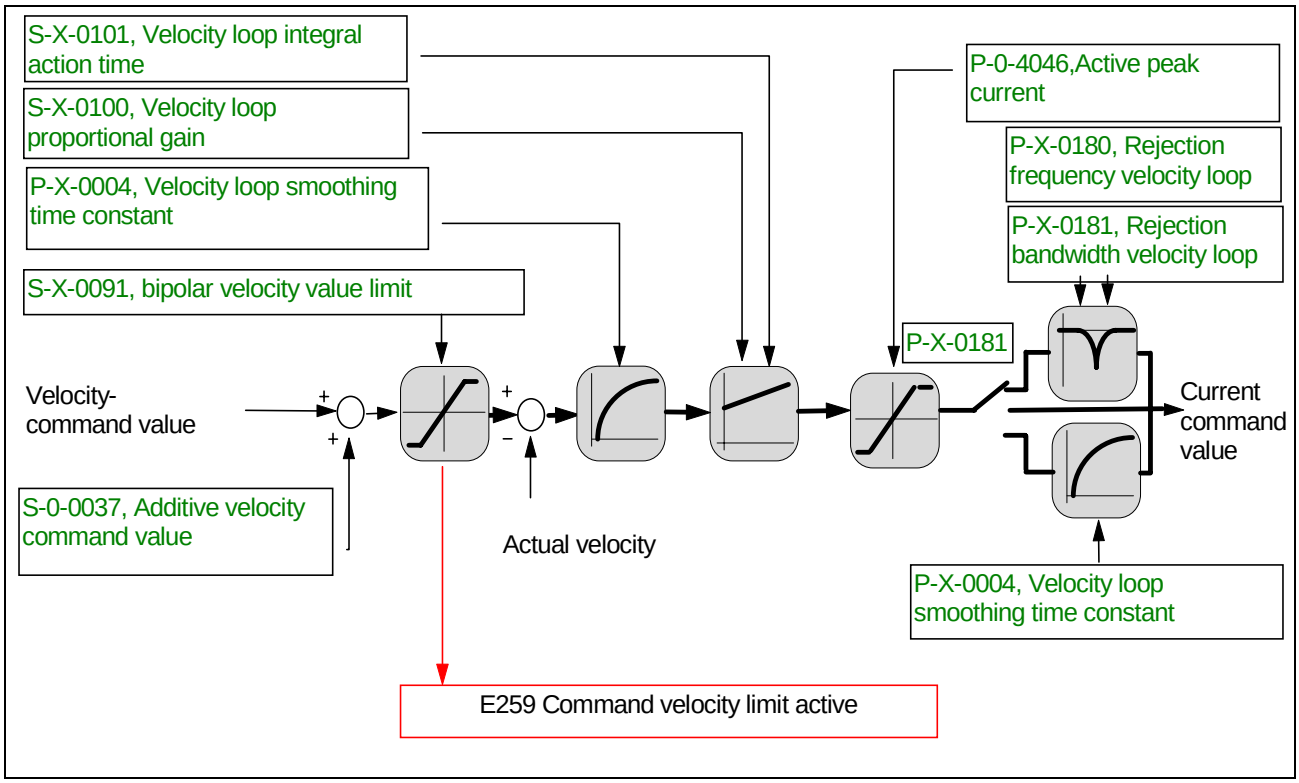

S-X-0101, Velocity loop integral action time
S-X-0100, Velocity loop proportional gain
P-X-0004, Velocity loop smoothing time constant
S-X-0091, bipolar velocity value limit
P-0-4046,Active peak current
P-X-0180, Rejection frequency velocity loop
P-X-0181, Rejection bandwidth velocity loop
P-X-0181
Velocity-command value
Current command value
S-0-0037, Additive velocity command value
Actual velocity
P-X-0004, Velocity loop smoothing time constant
E259 Command velocity limit active

Fig. 7-7: Velocity Controller

See also chapter: "Generator function Velocity control"

See also chapter: "Current Controller".

Current Controller

The current controller is parameterized with **S-0-0106, Current loop proportional gain 1** and **S-0-0107, Current loop integral action time 1**.

(See also chapter: "Setting the Current Controller".)

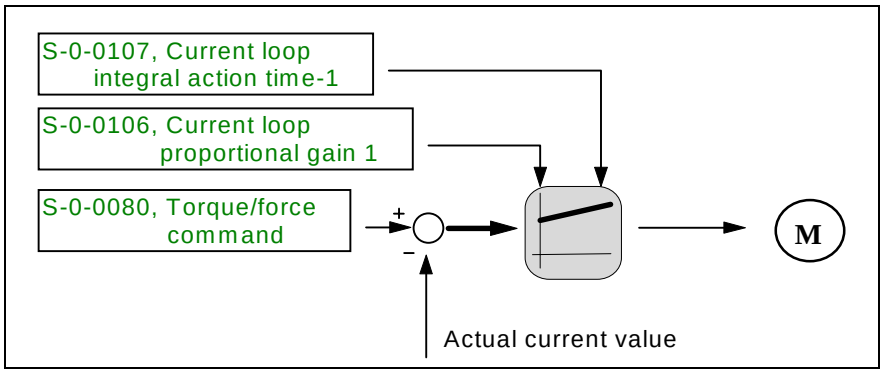


Fig. 7-8: Current Controller

Velocity Control with Analog Command Communications

To activate the operating mode in conjunction with analog command communications, note the following procedure:

- Select the mode with **S-0-0032, Primary mode of operation**
- Parametrize the analog channel **P-X-0213, Analog input 1, assignment to** parameter **S-0-0036, Velocity command value**
- Define the resolution with the help of **P-X-0214, Analog input 1, scaling per 10V full scale**.
- If necessary, set offset compensation via **P-0-0217, Analog input 1, offset**.

Diagnostic Messages

Operating mode specific monitors are

- **E259 Command velocity limit active**
  If the resulting command value is in the limit, then warning **E259 Command velocity limit active** is displayed.

E263 Velocity command value > limit S-0-0091 .
Parameter **S-0-0036, Velocity command value** is set to the value of parameter **S-X-0091, Bipolar velocity limit value**. The warning **E263 Velocity command value > limit S-0-0091** is generated**.**

7.5 Mode: Drive Internal Interpolation

The drive is given a target position in the **Drive Internal Interpolation** operating mode. When the operating mode is activated, the diagnostic message is one of the following:

- **A106 Drive Controlled (Internal) Interpolation / Encoder 1**
- **A107 Drive Controlled Interpolation / Encoder 2**
- **A108 Drive Controlled Interpolation / Encoder 1 / Lagless**
- **A109 Drive Controlled Interpolation / Encoder 2 / Lagless**

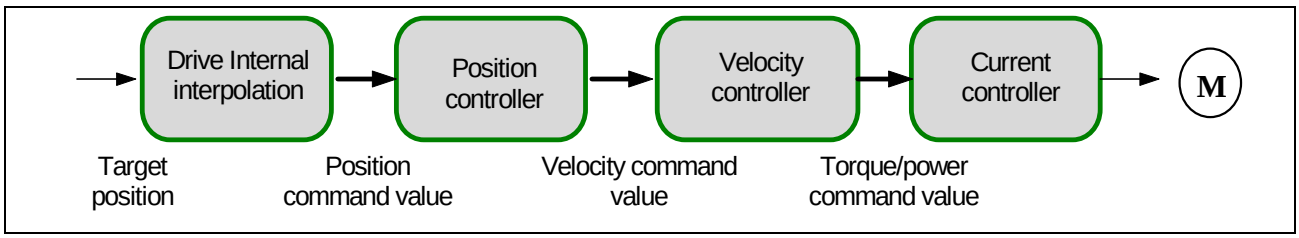


Fig. 7-9: Drive-internal interpolation diagram

Function principle: Drive Internal Interpolation

The target value is entered in the parameter **S-0-0258, Target Position** . The drive generates the position command profile necessary to move to the target position using the following parameters as limits:

- **S-0-0259, Positioning velocity**
- **S-0-0260, Positioning acceleration**
- **S-0-0193, Positioning jerk**
- **S-0-0108, Feedrate override**

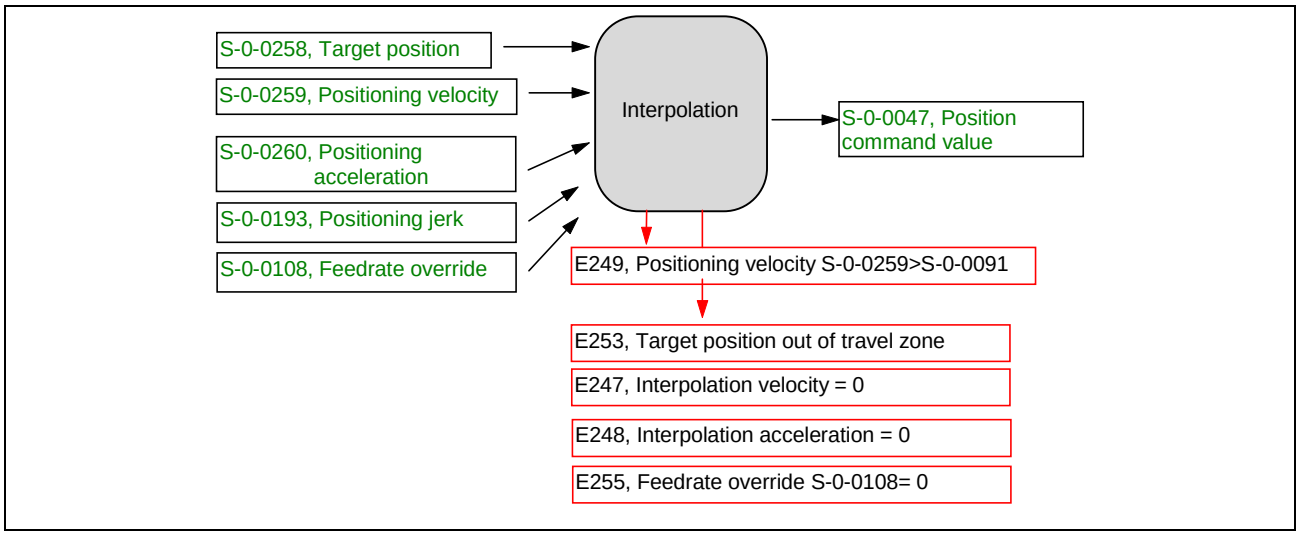


Fig. 7-10: Generator function drive internal generator function

See also position controller

See also velocity controller

See also current controller

Monitoring in mode: "Drive-internal interpolation"

The following checks are executed:

- If axis limit value monitoring is activated (Bit 4 of **S-0-0055, Position Polarity Parameter** is set) and the measurement system used for the operating mode has been homed, the parameter **S-0-0258, Target Position** is monitored for staying within the axis limit values. If these are exceeded, the warning **E253 Target position out of travel zone** is generated.

  The prescribed target position will not be accepted.

- If the prescribed positioning velocity **S-0-0259, Positioning velocity** exceeds the maximum allowable (**S-X-0091, Bipolar Velocity Limit Value**), the warning **E249 Positioning velocity S-0-0259 > S-0-0091** will be generated.

  The drive will move at the velocity **S-X-0091, Bipolar Velocity Limit Value** to the new target position.

- If the positioning velocity specified in **S-0-0259, Positioning velocity** equals 0, then warning **E247 Interpolation velocity = 0** is generated.
- If the factor affecting positioning velocity as set in **S-0-0108, Feedrate override** equals 0, then warning **E255 Feedrate-override S-0-0108 = 0** is generated.
- If the positioning acceleration specified in **S-0-0260, Positioning acceleration** equals 0, then warning **E248 Interpolation acceleration = 0** is generated.

Status messages during operating mode "Drive-internal interpolation"

In parameters S-0-0013, class 3 diagnostics and S-0-0182, manufacturers class 3 diagnostics there are the following status messages specifically for this mode:

- ***target position reached***, bit 12 of **S-0-0013, Class 3 Diagnostics** is 1, if it applies: internally effective command value equals **S-0-0258, Target Position**. This message then becomes 1, if the position command value generated by the drive-internal interpolator reaches the set target value.
- ***In target position***, bit 10 of **S-0-0182, Manufacturer Class 3 Diagnostics** is 1, if it applies: absolute difference between **S-0-0258, Target Position** and **S-0-0051/53, Position Feedback Value 1/3** smaller than **S-X-0057, Position window**. This message then becomes 1, if the relevant position feedback value is target positoin range +/- positioning window.
- ***IZP***, bit 6 of **S-0-0182, Manufacturer Class 3 Diagnostics** is a link of several status messages and is 1 if it applies: ***In target position*** = 1, i.e., absolute difference between **S-0-0258, Target Position** and **S-0-0051/53 Position feedback value 1/2** smaller than **S-X-0057, Position window** AND ***IN_POSITION*** = 1, i.e., amount of **S-0-0189, Following Error** smaller than **S-X-0057, Position window** AND ***Vist = 0***, amount of **S-0-0040, Velocity Feedback Value** smaller than **S-X-0124, Standstill window.**

The following profile explains how the status messages work:

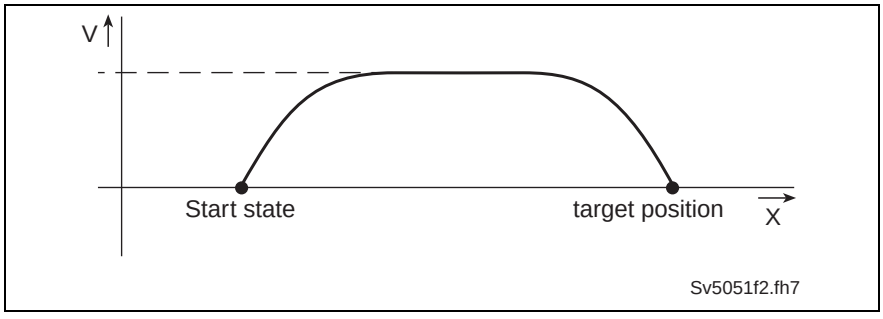


Fig. 7-11: Profile to explain how the interpolation status messsages work

In this example, the drive is on the start position, when the new target position is given.

The following time diagrams result:

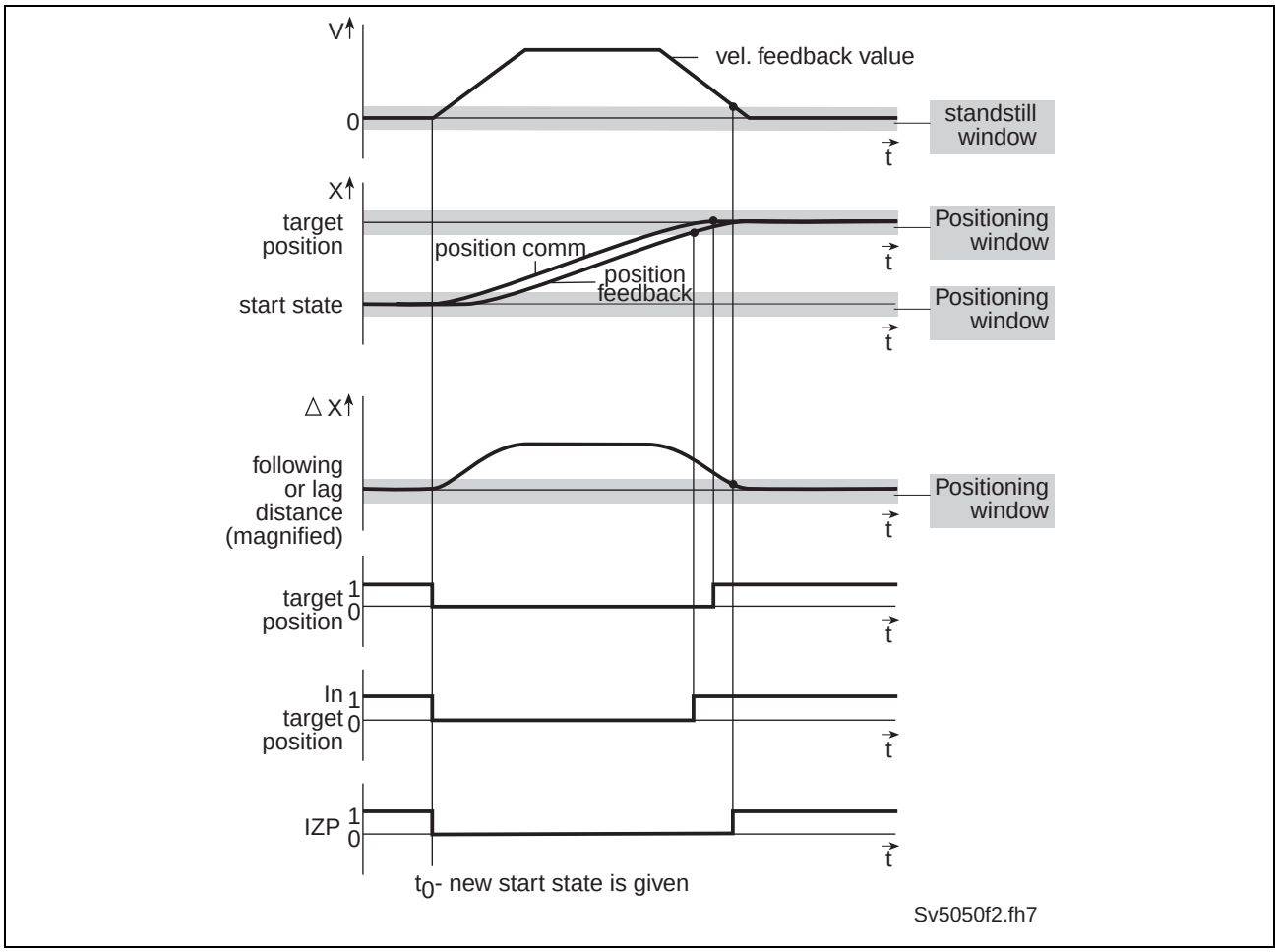


Fig. 7-12: Generating the status bit of the operating modes with drive-internal interpolation

7.6 Mode: Relative drive-internal interpolation

In operating mode **Relative drive-internal interpolation** the drive is given a path in parameter **S-0-0282, Travel distance.** If bit 0 of the acceptance parameter **S-0-0346, Setup flag for relative command values** toggels (change), then it is added to the target position in **S-0-0258, Target position**. The drive generates the needed position command value profile to bring itself to the target position. It hereby maintains the velocity, accel and jerk limit values.

In units equipped with parallel interface or parallel inputs the positioning block transfer input effects parameter **S-0-0346, Setup flag for relative command values.**

A positive edge at positioning block transfer input toggles parameter S-0-0346.

Pertinent Parameters

- **S-0-0258, Target position**
- **S-0-0282, Travel distance**
- **S-0-0259, Positioning Velocity**
- **S-0-0260, Positioning Acceleration**
- **S-0-0193, Positioning Jerk**
- **S-0-0346, Setup flag for relative command values**
- **S-0-0393, Command value mode**
- **S-0-0108, Feedrate override**

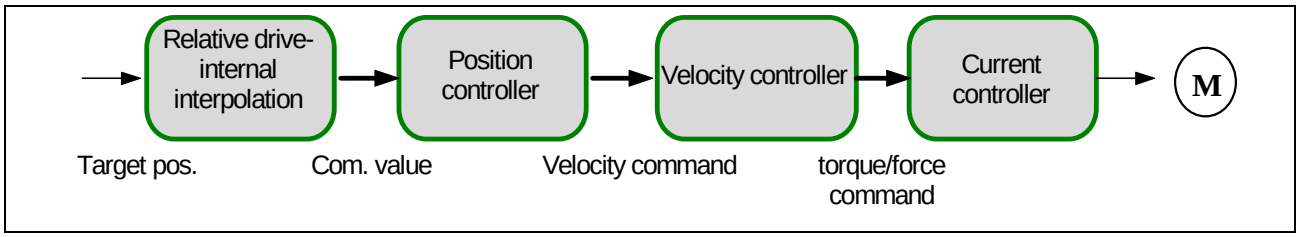


Fig. 7-13: Block diagram of relative drive-internal interpolation

Function principle: Relative drive-internal interpolation

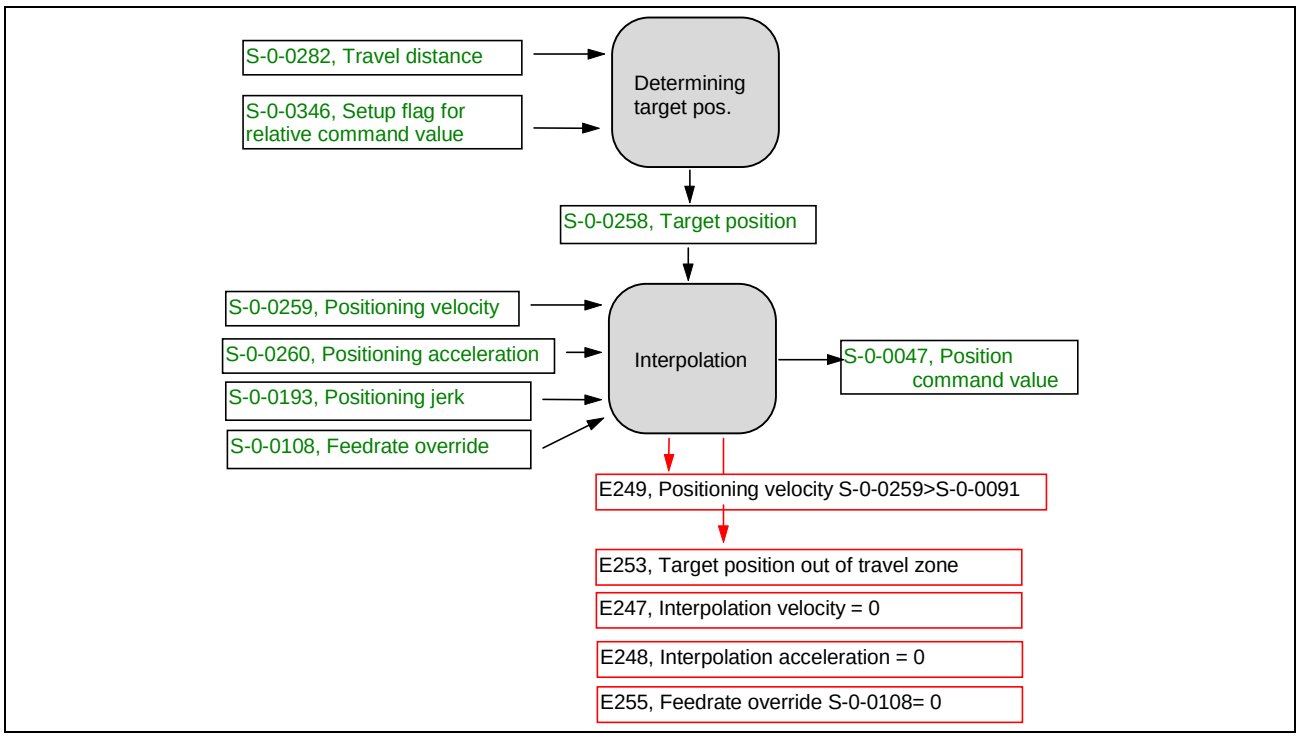


Fig. 7-14: Generator function relative drive-internal interpolation

See also chapter: position controller
See also chapter: velocity controller
See also chapter: current controller

After the operating mode is activated, the drive first positions to that position specified in parameter **S-0-0258, Target position**.

The parameter is stored when the control voltage is switched off so that if an absolute measuring system is used, the target position is still retained. The reference dimension is not lost.

If there is no absolute measuring system then the actual position value is preset in parameter **S-0-0258, Target position**.

Upon activating the operating mode, depend on **S-0-0393, Command value mode,** the traversing path relates to the actual position or the value in parameter **S-0-0258, Target position**.

Diagnostic Messages

The diagnoses read as follows upon activation of an operating mode:

- **A146 Relative drive controlled interpolation, encoder 1**
- **A147 Relative drive controlled interpolation, encoder 2**
- **A148 Relative drive contr. interpolation, enc. 1, lagless**
- **A149 Relative drive contr. interpolation, enc. 2, lagless**

Given an activated operating mode, the followng checks are conducted:

- **E253 Target position out of travel range**
  If position limit value monitor is active (bit 4 of **S-0-0055, Position Polarity Parameter** is set) and the measuring system used for the mode is in reference (**S-0-0403, Position feedback value status** = 1), then the sum of **S-0-0282, Travel distance** and **S-0-0258, Target Position** is monitored to ensure that it maintains the position limit value. Otherwise, the sum of the overtravelling of the drive-internally depicted numeric range (visible in the minimum and maximum input values of the travel distance parameter) is monitored. In either case, if the allowable range is exceeded, the warning **E253 Target position out of travel zone** is generated. The set travel path is not accepted if the acceptance toggles.
- **E249 Positioning velocity S-0-0259 > S-0-0091**
  If the positioning velocity set in **S-0-0259, Positioning velocity** exceeds maximum allowable velocity set in **S-X-0091, Bipolar Velocity Limit Value** then the warning **E249 Positioning velocity S-0-0259 > S-0-0091** is generated. The set travel path is not accepted if the acceptance toggels.
- **E247 Interpolation velocity = 0**
  If the positioning velocity set in **S-0-0259, Positioning velocity** equals 0, then warning **E247 Interpolation velocity = 0** is generated.
- **E255 Feedrate-override S-0-0108 = 0**
  If the factor affecting the positioning velocity in **S-0-0108, Feedrate override** equals 0, then warning **E255 Feedrate-override S-0-0108 = 0** is generated.
- **E248 Interpolation acceleration = 0**
  If the positioning acceleratiion set in **S-0-0260, Positioning acceleration** equals 0, then the warning **E248 Interpolation acceleration = 0** is generated.

Status messages during operating mode "Relative drive-internal interpolation"

see chapter: "Status messages during operating mode Drive-internal interpolation"

Notes

8 Basic Drive Functions

8.1 Physical Values Display Format

Data exchange between the controller and the primary control system or user interface occurs by reading and writing controller parameters. Information about the unit and the number of decimal places (see also parameter) is necessary for interpreting the operating data of a parameter. The LSB value of the operating data is generated out of this data. The following illustration shows this with an example.

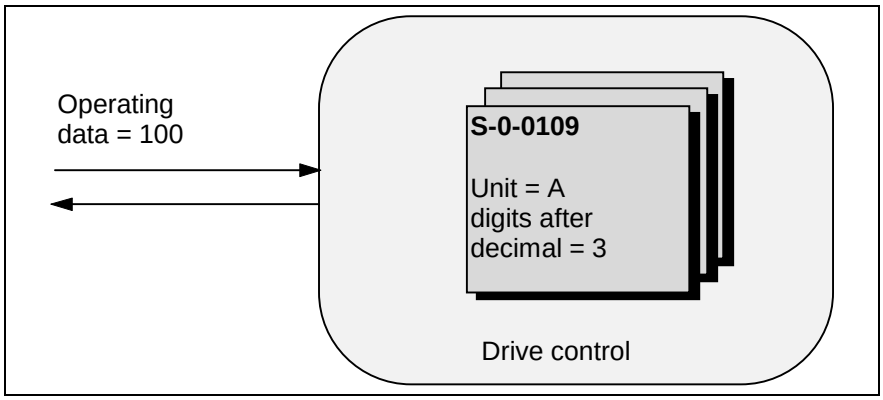


Fig. 8-1: Example for interpreting operating data in the drive

The combination of unit and number of decimal places is expressed with the term scaling.

The operating data of the parameter S-0-0109 is given the value 100 in the picture shown above. When combined, the unit A(mps) that belongs to this parameter and the number of decimal places produce the physical value **0.100 A**.

Each parameter can therefore be called up with a unit and the number of decimal places. The combination of these two criteria is united under the term **scaling**. When interpreting operating data, these must always be included in the analysis. Units and number of decimal places are listed along with all other parameter attributes in Supplement A, Parameter Description, for each parameter.

Adjustable Scaling for Position, Velocity, and Acceleration Data

The LSB value of position, velocity, and acceleration data can be set by adjustable scaling.

The parameter scaling for

- position,
- velocity and
- acceleration data

can be adjusted. It can be set by the user with scaling parameters. It enables

1. the value of this data to be made compatible for exchange between control system and control drive, or, in other words, the data can be exchanged in the control system's internal format. The control system will not need to convert this data.

2. this data to conform to machine kinematics.

It is possible to select between preferred and parameter scaling, as well as between motor and load reference.

Rotary scaling

Rotary units are generally used with main spindle drives.

Preferred Scaling - Parameter Scaling

Adjustable scaling allows either preferred scaling or parameter scaling to be selected. If preferred scaling is selected, the appropriate scaling factor parameters and scaling exponent parameters in **S-0-0128, C200 Communication phase 4 transition check** are overwritten with preferred values. This sets a pre-defined scaling. The scaling factor parameter and the scaling exponent parameter are not entered.

The following preferred scalings are available:

Physical Value:	**Rotary Preferred Scaling:**
Position data	0.0001 Degrees
Velocity Data	0.0001 RPM, or 10^-6 Rev/s
Acceleration Data	0.001 rad/s²

Fig. 8-2: Preferred scaling

Motor Reference - Load Reference

Either motor reference or load reference can be selected when adjusting the scaling.

With rotary load reference, the scaled data from the motor format is converted to the transmission output format with the transmission ratio **S-X-0122, Output revolutions of load gear** / **S-X-0121, Input revolutions of load gear**.

Display Format of Position Data

The scaling of drive controller position data is adjustable. This is done with the parameters

- **S-0-0076, Position Data Scaling Type**
- **S-0-0079, Rotational position resolution**

To set rotary position scaling, use parameter **S-0-0079, Rotational position resolution**

Scaling type is set in **S-0-0076, Position data scaling type**.

The parameter is defined as follows:

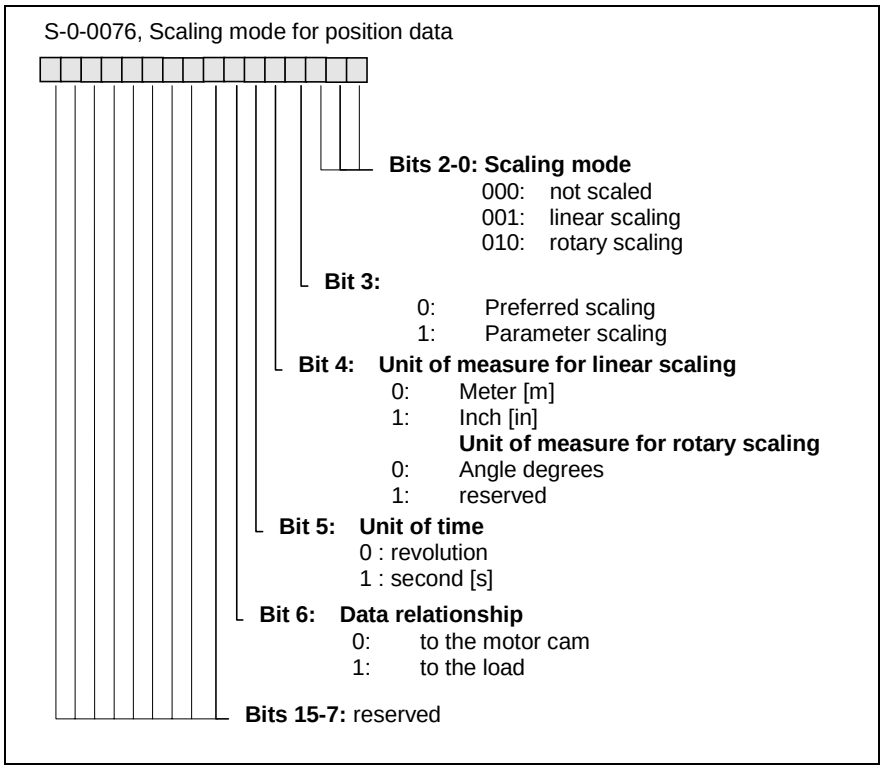


Fig. 8-3: S-0-0076, Position Data Scaling Type

The actual scaling type is set in bit 0..2. There is a choice between unscaled (incremental scaling) and rotary scaling.

Select in bit 3 between preferred and parameter scaling. With preferred scaling, parameter **S-0-0079, Rotational position resolution** is set to 3600000 steps/revolution and cannot be changed. With parameter scaling, the user can input the position resolution in parameter **S-0-0079, Rotational position resolution** (See section: preferred/parameter scaling).

Bit 4 specifies the dimensional unit. With main spindle drives, only angle degrees may be selected.

Bit 6 defines motor or load reference.

Bit 7 determines the processing format. With main spindle drives, only modulo format is possible.
(See section: modulo function.)

The scaling type setting is checked for plausibility in **S-0-0128, C200 Communication phase 4 transition check**, and the command error message **C213 Position Data Scaling Error** is generated, if necessary.

Velocity Data Display Format

The scaling of the drive controller's velocity data is adjustable.

This is done with the parameters

- **S-0-0044, Velocity data scaling type**
- **S-0-0045, Velocity data scaling factor**
- **S-0-0046, Velocity data scaling exponent**

The scaling type is set in **S-0-0044, Velocity data scaling type**. The parameter is defined as follows:

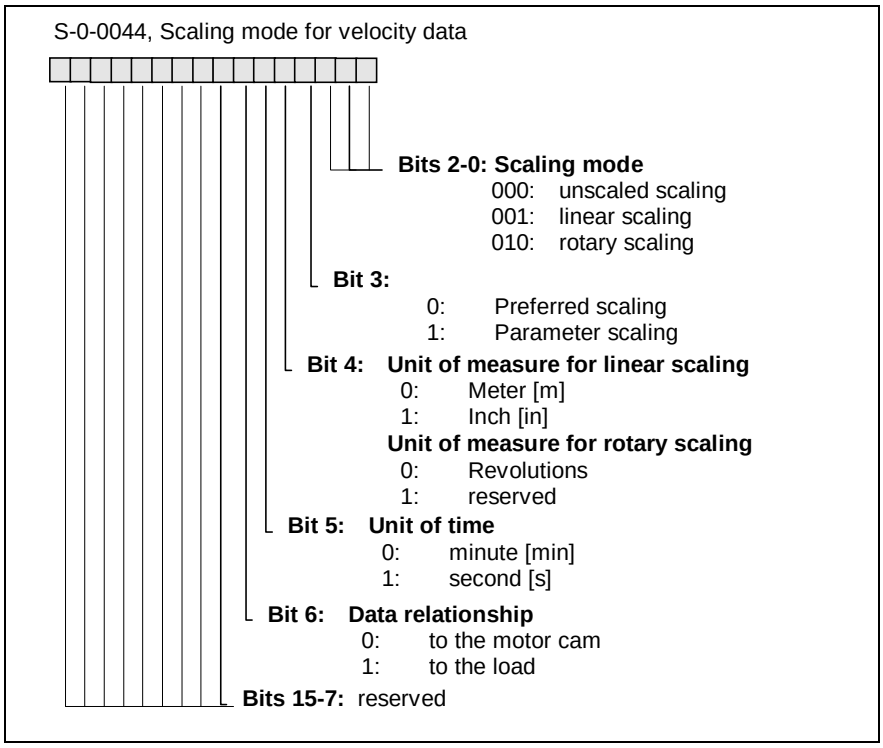


Fig. 8-4: S-0-0044, Velocity data scaling type

In bit 0..2 the actual scaling type is set. There is a choice between unscaled (incremental scaling) and rotary scaling.

In bit 3 the choice between preferred scaling, i.e., parameters **S-0-0045, Velocity data scaling factor**, and **S-0-0046, Velocity data scaling exponent** are predefined and cannot be changed, and parameter scaling, i.e,. scaling is set by inputting this parameter (see section: "Preferred scaling / parameter scaling").

Bit 4 specifies the unit. In the case of main spindle drives, only "Revolution" is possible.

Bit 5 sets time unit, i.e., minute or seconds.

Bit 6 defines motor or load reference.

The scaling type setting is checked for plausibility in **S-0-0128, C200 Communication phase 4 transition check,** and the command error message **C214 Velocity Data Scaling Error** is generated, if necessary.

Acceleration Data Display Format

The scaling of the drive controller's acceleration data is adjustable.

This is done with the parameters

- **S-0-0160, Acceleration data scaling type**
- **S-0-0161, Acceleration data scaling factor**
- **S-0-0162, Acceleration data scaling exponent**

The scaling type is set in **S-0-0160, Acceleration data scaling type**. The parameter is defined as follows:

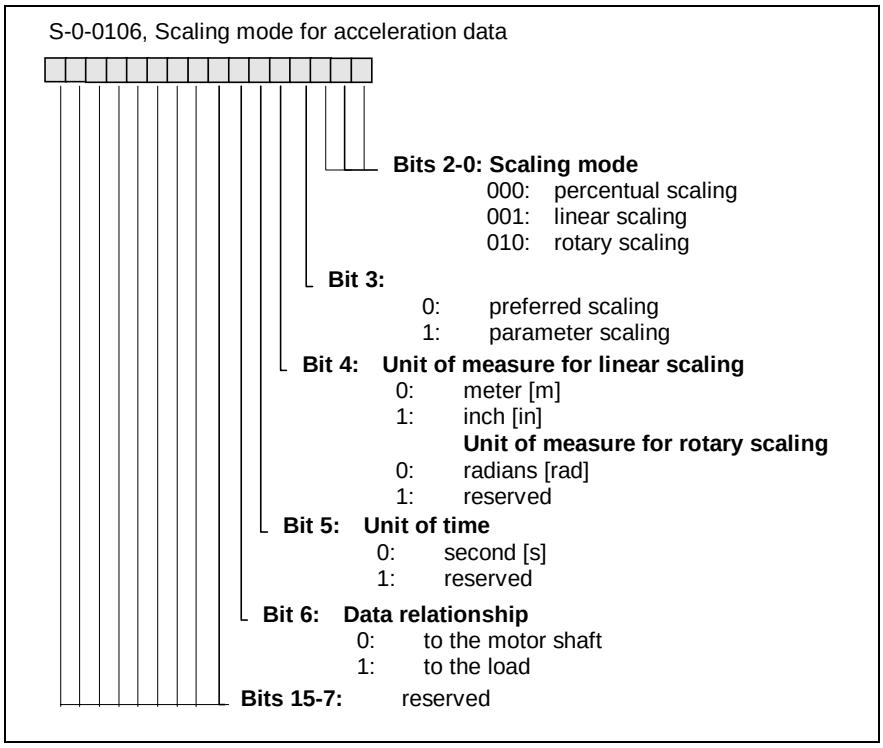


Fig. 8-5: S-0-0160, Acceleration data scaling type

In bit 0..2 the actual scaling type is set. There is a choice between unscaled (incremental scaling) and rotary scaling.

In bit 3 the choice between preferred scaling, i.e., parameters **S-0-0161, Acceleration data scaling factor**, and **S-0-0162, Acceleration data scaling exponent** are predefined and cannot be changed, and parameter scaling, i.e,. scaling is set by inputting this parameter (see section: "Preferred scaling / parameter scaling").

Bit 4 specifies the unit. In the case of main spindle drives, only "Radiant" is possible.

Bit 6 defines motor or load reference.

The actual scaling type is set in bit 0..2.

The scaling type setting is checked for plausibility in **S-0-0128, C200 Communication phase 4 transition check,** and the command error message **C215 Acceleration Data Scaling Error** is generated, if necessary.

Command Polarities and Actual Value Polarities

The drive-internal polarities of position, velocity, torque/force and actual value are fixed. The following applies:

Motor type:	Drive internal positive direction definition:
Rotary motors	Clockwise rotation facing the motor shaft

Fig. 8-6: Drive internal positive direction definition

The positive direction is specified by the manufacturer for MHD-, MKD and MKE motors. Asynchronous motors and linear synchronous motors should be set in this direction during installation. (see "other motor encoder characteristics"). The command polarity and actual value polarity of the drive is thereby fixed.

If the drive's definition of the positive direction does not conform to the requirements of the machine, the parameters

- **S-0-0055, Position Polarity Parameter**
- **S-0-0043, Velocity polarity parameter**
- **S-0-0085, Torque/Force polarity parameter**

can invert the command and actual value polarities.

Note: If the polarity needs to be changed, all 3 parameters should always be inverted at the same time, so that the polarities of the position, velocity, and torque/force have the same sign.

The following illustration shows the operating characteristics of the polarity parameters.

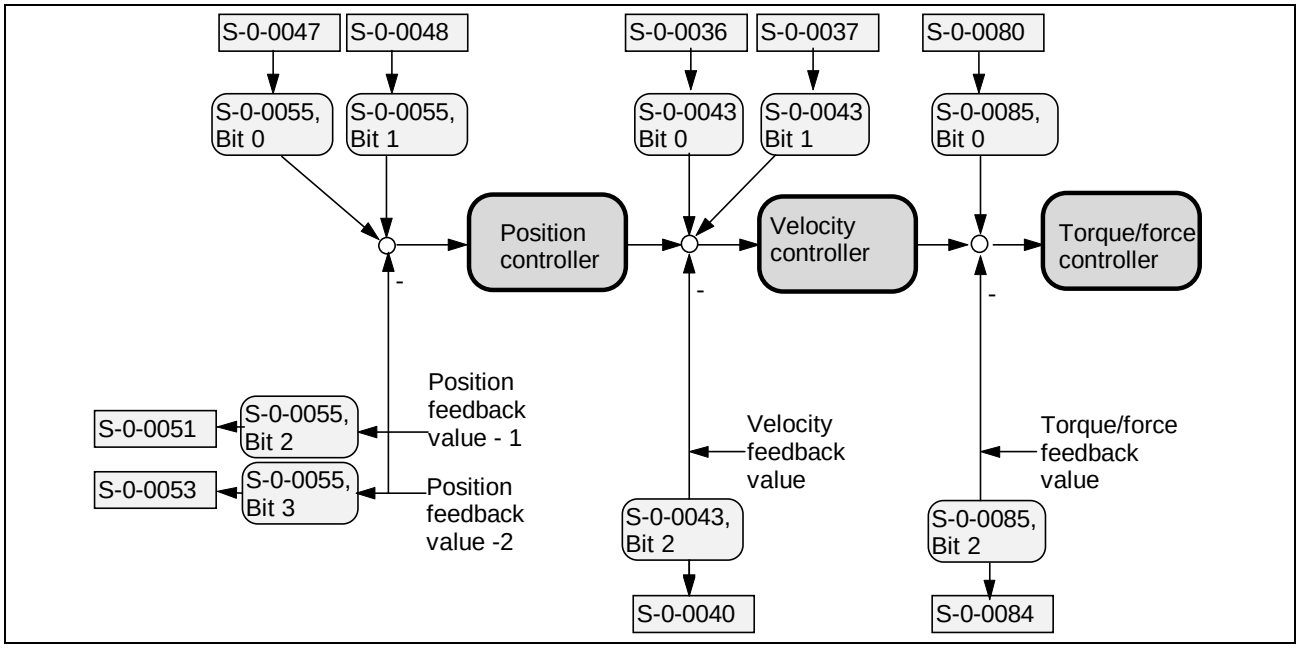


Fig. 8-7: Polarity parameter operating characteristics

The polarity parameters affect only the display values, not the control feedback values.

The drive software only allows all bits within a polarity parameter to be inverted. If bit 0 is inverted, all other bits of the parameter are also inverted. This prevents setting positive feedback in the regulator loops because of faulty command and feedback value polarities.

Mechanical Transmission Elements

Mechanical transmission elements are gearboxes and feed mechanisms between the motor shaft and the load. Entering these data is necessary for the load to convert the position, velocity, and acceleration physical values, if these are scaled for the load. (See also "Adjustable Scaling for Position, Velocity, and Acceleration Data".) To see if this parameter has been entered correctly, move the shaft and compare the path followed with the position feedback value and the path actually taken.

Transmission Ratio

The transmission ratio can be determined with the parameters

- **S-X-0121, Input revolutions of load gear**
- **S-X-0122, Output revolutions of load gear**

The ratio between transmission input and transmission output is parameterized here.

An individual gear ratio can be input for each parameter block.

If the parameter block transition function is used, then the parameter block must have the correct ratio.

Example:

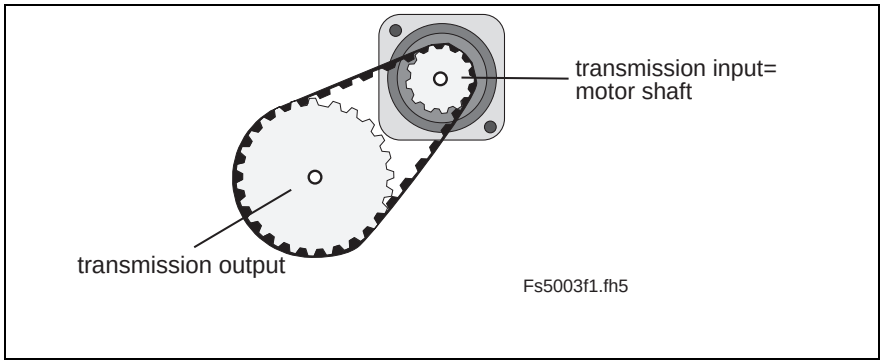


Fig. 8-8: Transmission ratio parameterization

In the illustration above, 5 transmission input revolutions (= motor revolutions) were equivalent to 2 transmission output revolutions. The proper parameterization for this would be :

- **S-0-0121, Input revolutions of load gear = 5**
- **S-0-0122, Output revolutions of load gear = 2**

If the parameter block transition is used, then parameter blocks 1, 2 and 3 must also have the correct gear ratio.

- **S-1-0121, Input revolutions of load gear = 5**
- **S-2-0121, Input revolutions of load gear = 5**
- **S-3-0121, Input revolutions of load gear = 5**

and

- **S-1-0122, Output revolutions of load gear = 2**
- **S-2-0122, Output revolutions of load gear = 2**
- **S-3-0122, Output revolutions of load gear = 2**

Modulo Feature

With activated modulo function, the position data are only illustrated within the modulo range

When the modulo function is activated, all position data are displayed in the range 0 till (modulo value -1). Thus it is possible to implement an axis which can move infinitely in one direction. There is no overrunning of the position data. This references the value range of the position data to one revolution of the spindle, e.g., 1 rev. = 360°). In the case of an infinite spindle revolution there is no overrunning of the position data as the actual position value starts with zero after each revolution!

The modulo value is set with the parameter **S-0-0103, Modulo Value**.

The modulo function is activated by the parameter **S-0-0076, Position Data Scaling Type**.

(See also "Display Format of Position Data".)

When the modulo function is activated, all position data are displayed in the range 0... (modulo value). Thus it is possible to implement an axis which can move infinitely in one direction. There is no overrunning of the position data.

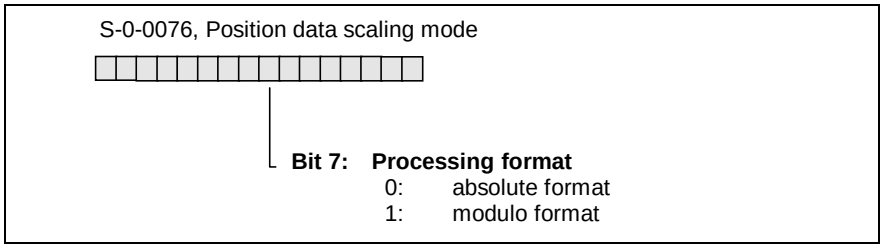


Fig. 8-9: Setting absolute format - modulo format

Note: Modulo processing of position data to is only allowed with rotary motor types. This is checked in **S-0-0128, C200 Communication phase 4 transition check** and acknowledged by the command error **C213 Position Data Scaling Error** if necessary.

The following illustration shows the difference in displaying the position data in absolute format and modulo format:

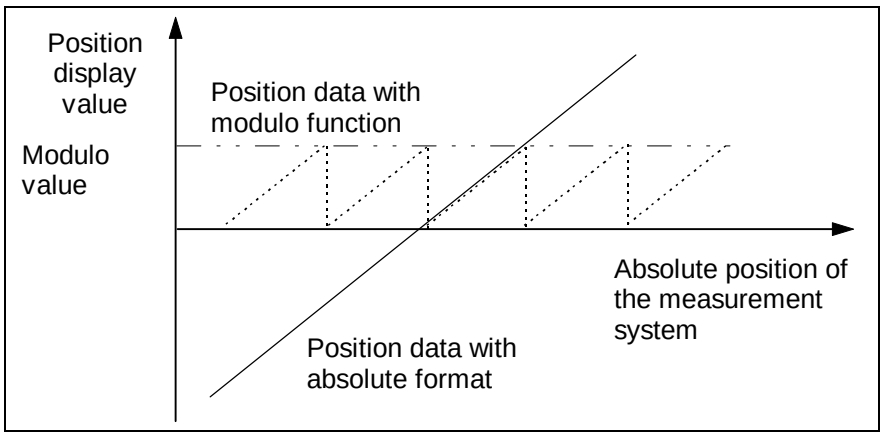

Position display value
Position data with modulo function
Modulo value
Absolute position of the measurement system
Position data with absolute format

Fig. 8-10: Display value of positions in absolute format and modulo format

Modulo Processing-Limiting Conditions

If modulo processing of position data is selected, in connection with

- the active operating mode and
- the selected position scaling

the following limiting conditions for error-free processing of the position data must be observed.

Maintaining the marginal conditions is checked in **S-0-0128, C200 Communication phase 4 transition check** and, if necessary, the command completed with error **C227 Modulo range error**.

The marginal conditions for the error-free processing of the modulo values are:

- **S-0-0103, Modulo value** for spindles should be set to 360° (the default value).
- If rotary position scaling with position reference is set, then the product of **S-0-0103, Modulo value**, **S-0-0116, Feedback 1 Resolution** and **S-X-0121, Input revolutions of load gear** must be smaller than 2^63.

If, in addition to this, an external measurement system is used, the additional requirements are:

- If rotary position scalnig and motor reference are set, then the product of **S-0-0103, Modulo value**, **S-0-0117**, **Feedback 2 Resolution** and **S-X-0122, Output revolutions of load gear** must be smaller than 2^63.

Processing Command Values in Modulo Format, Shortest Path - Direction Selection

The interpretation of position command values such as **S-0-0047, Position Command Value** and **S-0-0258, Target Position** when the modulo function has been activated is dependent on the selected mode.

The following possibilities exist:

- Shortest Path
- Positive Direction
- Negative Direction

Parameter **S-0-0393, Command value mode** is used to set the mode. This parameter is effective only if modulo format has been activated in **S-0-0076, Position data scaling type**.

The following settings can be entered:

S-0-0393:	meaning
0	Shortest Path
1	Positive Direction
2	Negative Direction

Fig. 8-11: Choose Modulo Mode

Modulo Mode "Shortest Path"

The next command value is reached with the shortest path. If the difference between two successive command values is greater than half of the modulo value, the drive moves toward the command value in the opposite direction.

Modulo Mode "Positive Direction"

The command value is always approached in a positive direction, regardless of whether or not the difference between two successive command values is greater than half of the modulo value.

Modulo Mode "Negative Direction"

The command value is always approached in a negative direction, regardless of whether or not the difference between two successive command values is greater than half of the modulo value.

8.2 Setting the Measurement System

The following feedback systems can be evaluated with the DIAX series of controllers:

- Digital servo feedback
- Resolver
- Incremental encoder with sine signals
- Incremental encoder with square-wave signals
- Indramat gearwheel-type encoder
- Measurement system with SSI interface
- Measurement system with EnDat interface
- Gearwheel encoder with 1Vpp signals
- Resolver without feedback memory
- Resolver with one pole pair without feedback data memory plus incremental encoder with sine signals.

The drive is connected to an encoder interface (standard), either a digital servo feedback or a resolver. Additional plug-in cards are available for evaluating different types of encoders. Specifically, the following measurement systems can be implemented with the corresponding module shown below.

Feedback System:	Module:	Value in P-0-0074/75
Digital servo feedback or resolver	Standard	1
Incremental feedback with sine signal from the Heidenhain company, either µA or 1V signals selectable	DLF01.1M	2
Indramat gearwheel encoder	DZF02.1M	3
Digital servo feedback	DFF01.1M	4
Incremental encoder with square-wave signals from the Heidenhain company	DEF01.1M	5
Incremental encoder with square-wave signals from the Heidenhain company	DEF02.1M	6
Encoder with SSI interface (only 4096 incr./rev.)	DAG01.2M	7
Encoder with EnDat interface	DAG01.2M	8
Gearwheel encoder with 1Vpp signals	DZF03.1M	9
Resolver without feedback memory	Standard	10
Resolver without feedback memory plus incremental encoder with sine signals	Standard + DLF01.1M	11
ECI encoder from Heidenhain	standard	1

Fig. 8-12: Feedback systems and necessary plug-in modules

Each module is assigned a number that determines the feedback type. The module number is entered into the following parameters:

- **P-0-0074, Feedback type 1**
- **P-0-0075, Feedback type 2, external**

Command **S-0-0128, C200 Communication phase 4 transition check** checks whether the plug-in module of the parametrized encoder types are available. If a plug-in module is missing, then the relevant command error (**C232 Encoder 1 interface not present** or **C233 Encoder 2 interface not present**) is generated.

Displaying the position feedback values of the individual measurement systems is done with the parameters

- **S-0-0051, Position feedback 1 value**
- **S-0-0053, Position feedback 2 value(Ext. Feedback)**

Setting the absolute relationship of the position feedback values-1/2 to the machine zero point is done with the commands

- **S-0-0148, C600 Drive controlled homing procedure command, or**
- **P-0-0012, C300 Command 'Set absolute measurement'**

Limiting Conditions for Encoder Evaluation

The following limitations exist:

- The DLF, DZF, DEF 1 modules may not be simultaneously operated within a controller.

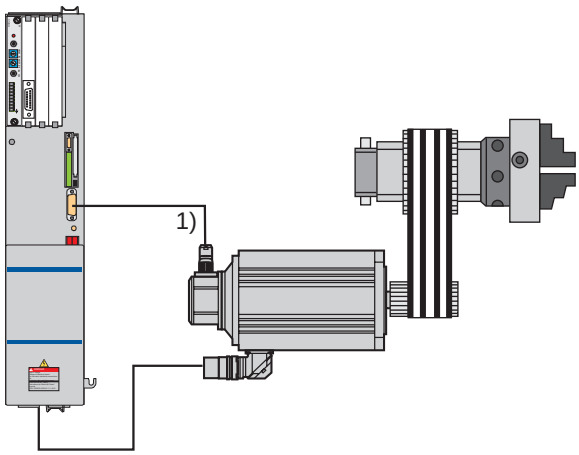
  ⇒ **Danger of Damage!**

  The combination of DLF and DZF is not possible. The DEF 2 module can be used to operate an incremental feedback with square-wave signals while a DLF or DZF is also being used.

- The DAG 1.2 contains a switch that allows the interface to be changed to an SSI interface (7) or an EnDat interface (8). Make sure that the switch is set correctly.
- If attempting to evaluate an optional encoder with an SSI interface, only measurement systems with a resolution of 4096 Incr./Rev. and absolute resolution can be used. If the position loop is closed via this measurement system, only a limited dynamic can be achieved because of the serial transmission from the feedback to the controller.
- Only the standard module, DLF, DZF, or DAG 1.2 can be used to evaluate a motor encoder.
- It is not possible to use a resolver as an external measurement system.

Motor Encoder

The measurement system which is directly coupled with the motor shaft without a gearboxbetween is called the motor encoder. As the motor is usually coupled to the load with a mechanical gearbox and probably a feed unit, we call this also an indirect distance measurement. If a further measurement system is attached directly to the load, we call this a direct distance measuring (see "Optional Encoder").



1) Indirect position actual feedback acquisition via the drive's internal position measuring system

Ap5175f1.fh7

Fig. 8-13: Application: Motor encoder with spindle

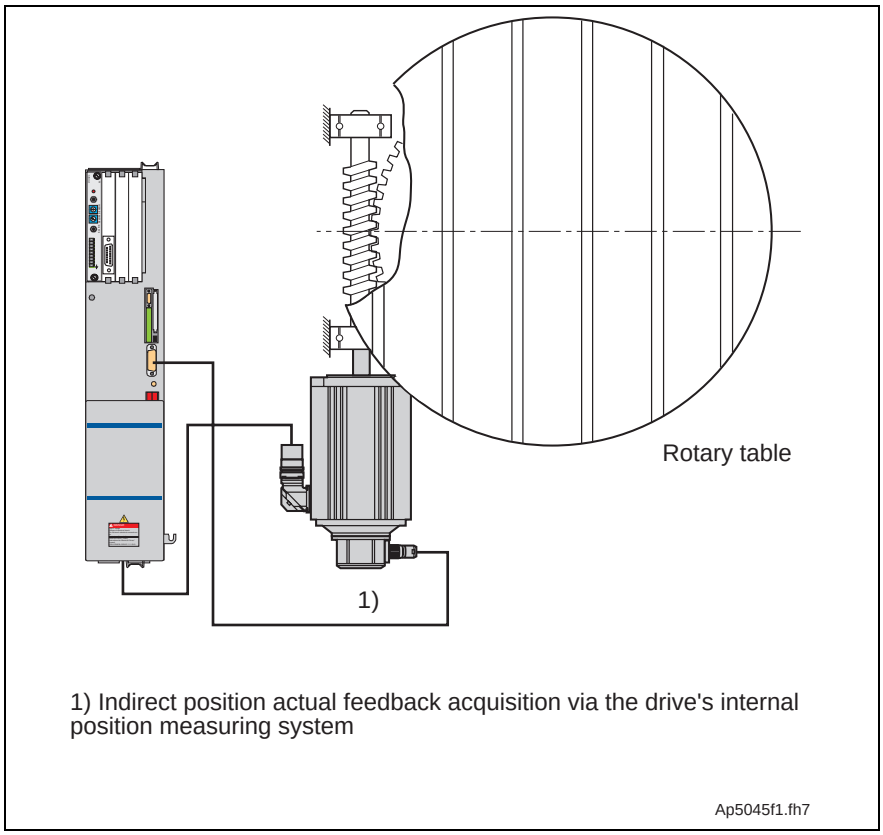

Rotary table
1)
1) Indirect position actual feedback acquisition via the drive's internal position measuring system
Ap5045f1.fh7

Fig. 8-14: Application: Motor encoder with rotary table

The following parameters

- **P-0-0074, Feedback type 1**
- **S-0-0116, Feedback 1 Resolution**
- **S-0-0277, Position feedback 1 type**

are used to parameterize the motor feedback. The encoder types of the linear measuring system, the motor feedback resolution, as well as the direction of movement and so on are set there. The parameter **S-0-0051, Position feedback 1 value** displays the position of the motor feedback.

The absolute Measurement relative to the machine zero point is set with

- **S-0-0148, C600 Drive controlled homing procedure command**

or, for absolute encoders,

- **P-0-0012, C300 Command 'Set absolute measurement'**

Determining the Feedback Interface of the Motor Feedback

Determining the encoder interface of the motor encoder implements parameter **P-0-0074, Feedback type 1**. Enter the number of the motor feedback in the parameter. The motor encoder interface in P-0-0074 is automatically set with certain types of motors.

(See also Capter "Characteristics of the Different Motor Types".)

The following measuring systems are allowed with the motor types with parametrizable motor encoder interfaces.

Feedback System	Encoder interface	Value in P-0-0074	for Synchronous motors	for Asynchronous motors
not equipped (only with rotary asynchronous motor)	-	0	no	yes
digitall servo feedback (DSF,HSF) or resolver	Standard	1	yes	yes
Incremental encoder with sinusoidal signals made by Heidenhain (1V - signals)	DLF01.1M	2	no	yes
Indramat gearwheel encoder	DZF02.1M	3	no	yes
Incremental encoder with square-wave signals made by Heidenhain (not recommended)	DEF01.1M	5	no	yes
encoder with EnDat interface made by Heidenhain	DAG01.2M	8	yes	yes
gearwheel encoder with 1Vss signals	DZF03.1M	9	no	yes
resolver without feedback data memory	standard	10	yes	no
Resolver without feedback data memory + incremental encoder with sinusoidal signals	Standard + DLF01.1	11	yes	no

Fig. 8-15: Determining the encoder interface for the motor encoder

Note: The motor encoder is only then unnecessary if you work with a loadside motor encoder. This is only possible with rotary asynchronous motors (**P-0-4014, Motor Type** = 2 or 6). In this case, the external encoder is the only control encoder (see also "Optional Encoder").

Motor Encoder Resolution

- The motor encoder resolution is parameterized in the parameter **S-0-0116, Feedback 1 Resolution**. Enter the graduation scale of the motor feedback. If using a measurement system with intrinsic feedback data storage, the resolution will be taken from this and does not need to be entered.

Measuring systems with intrinsic feedback memory:

- DSF, HSF
- Resolver
- EnDat

Other Motor Encoder Characteristics

To parameterize the other motor encoder characteristics, such as

- Direction of movement not-inverted/inverted
- Absolute evaluation possible
- Absolute evaluation activated

use **S-0-0277, Position feedback 1 type**. The structure of this parameter is as follows:

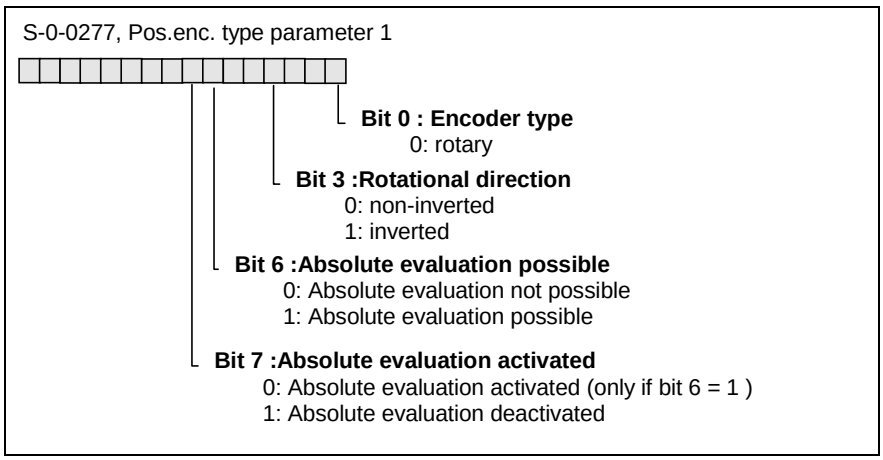

S-0-0277, Pos.enc. type parameter 1
Bit 0 : Encoder type
0: rotary
Bit 3 :Rotational direction
0: non-inverted
1: inverted
Bit 6 :Absolute evaluation possible
0: Absolute evaluation not possible
1: Absolute evaluation possible
Bit 7 :Absolute evaluation activated
0: Absolute evaluation activated (only if bit 6 = 1)
1: Absolute evaluation deactivated

Fig. 8-16: Parameter S-0-0277

The bits in the position encoder type parameter are partially set or deleted by the drive itself.

There are following dependencies:

- If the connected motor has a motor feedback memory (MHD, MKD or MKE), then bits 0, 1 and 3 are cleared.
- Depending on the absolute encoder range and the maximum travel range or modulo value, bit 6 is either set or cleared.

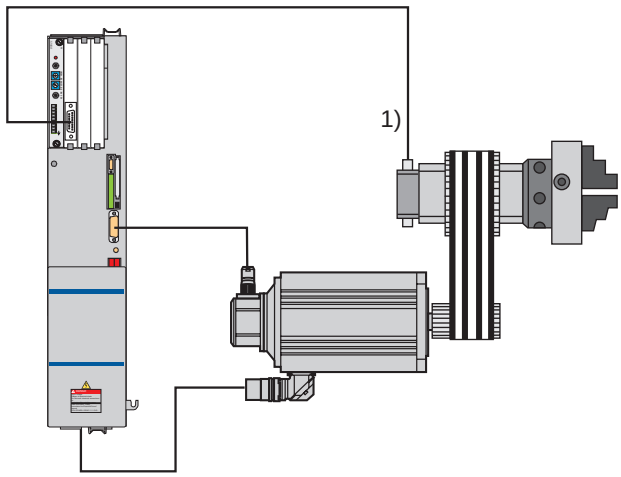
(See also Chapter"Other Settings for Absolute Measurement Systems".)

Optional encoder

The control with optional encoder facilitates a higher contour precision of the machined workpieces resp. a higher positioning accuracy. With setting the operation mode, you can determine that the position control in the drive is done with the position feedback of the optional encoder. Additionally, the velocity control can be completely or partially done with the velocity feedback signal of this measurement system.

(See also "Operating Modes" and "Setting the Velocity Mix Factor".)

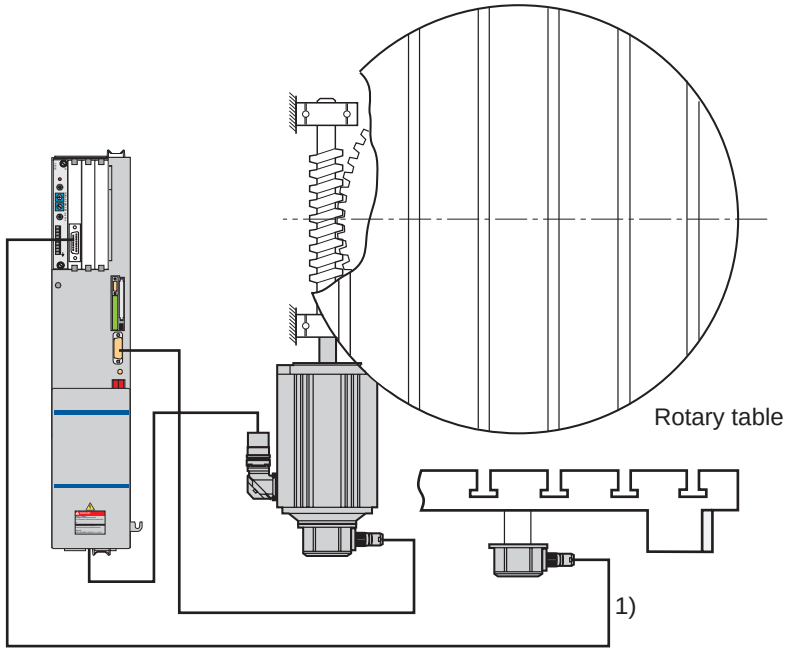
Typical application examples are shown in the following two pictures:



1) direct position actual feedback acquisition via an external measuring system

Ap5176f1.fh7

Fig. 8-17: Application: Optional encoder with spindle



1) direct position actual feedback acquisition via an external measuring system

Ap5043f1.fh7

Fig. 8-18: Application: Optional encoder with rotary table

The optional encoder is parameterized with the

- **P-0-0075, Feedback type 2**
- **S-0-0117, Feedback 2 Resolution**
- **S-0-0115, Position feedback 2 type**
- **P-0-0185, Function of encoder 2**

parameters. These specify the interface number to which the measurement system is connected, the resolution of the optional encoder, as well as the direction of movement, etc. The parameter **S-0-0053, Position feedback 2 value** displays the position of the optional encoder.

Set the reference measure to the machine zero point as follows:

- **S-0-0148, C600 Drive controlled homing procedure command**

or, for absolute encoders,

- **P-0-0012, C300 Command 'Set absolute measurement'**

The optional encoder can be used for different purposes.

The evaluation mode for the optional encoder is set in parameter **P-0-0185, Function of encoder 2**.

P-0-0185, Function of encoder 2.

Value in P-0-0185, Function of encoder 2	Definition
0	optional encoder as additional load-side control encoder for position and/or velocity control loops
1	optional encoder as master axis encoder
2	optional encoder as only load-side control encoder (only with rotary asynchronous motors)
3	optional encoder as measuring wheel encoder
4	optional encoder as spindle encoder treated like "optional encoder as auxiliary load-side control encoder for position and/or velocity control loop"; when exceeded, maximum possible signal frequency does not generate error but rather only deletes position status

Fig. 8-19: Function of the optional encoder

Determining the Encoder Interface of the Optional Encoder

The encoder interface of the optional encoder is determined with the parameter **P-0-0075, Feedback type 2**. The number of the module to which the optional encoder is connected must be entered in this parameter.

The following measuring systems and modules for the evaluation of an optional encoder are allowed:

Feedback System:	Module:	Number:
None	--	0
Digital servo feedback	Standard	1
Incremental encoder with sine signals from the Heidenhain Company, with either uA or 1V signals	DLF01.1M	2
Indramat gear-type encoder	DZF02.1M	3
Digital servo feedback from the Heidenhain or Stegmann companies	DFF01.1M	4
Incremental encoder with square-wave signals from the Heidenhain company	DEF01.1M	5
Incremental encoder with square-wave signals from the Heidenhain company	DEF02.1M	6
Encoder with SSI interface	DAG01.2M	7
Encoder with EnDat interface	DAG01.2M	8
Gearwheel encoder with 1Vpp signals	DZF03.1M	9

Fig. 8-20: Encoder interface of the optional encoder

If 0 is entered as the module number, the encoder evaluation of the optional encoder is switched off.

Warning

Do not use an encoder with an SSI-interface in the velocity control and position control operating modes.

⇒ Long dead times occur when reading the SSI-interface.

Optional Encoder Resolution

To parameterize the resolution of the optional encoder use the parameter **S-0-0117, Feedback 2 Resolution**. This parameter indicates the number of lines of the optional encoder. If using a measurement system with intrinsic feedback data storage, the resolution will be taken from this and does not need to be entered. Measurement systems with feedback storage are available if

- **Standard (1) ,**
- **DFF (4) or**
- **DAG 1.2 (8)**

is used as the optional encoder interface.

Actual Feedback Value Monitoring

In applications where an optional measurement system is used, the position feedback monitor can offer an additional margin of safety. The position feedback monitor can diagnose the following errors of the axis:

- Slip in the drive mechanical system
- Measurement system errors (as far as this is not recognized by the other measurement system monitors)

To set the monitor function use the parameter

- **S-0-0391, Monitoring window feedback 2**

If an error occurs, the error message **F236 Excessive Position Feedback Difference** is generated.

Basic Operating Characteristics of the Position Feedback Monitor

The position feedback monitor compares the position feedback value of the motor encoder with the optional encoder. If the deviation of both position values is greater than **S-0-0391, Monitoring window feedback 2**, the error **F236 Excessive Position Feedback Difference** is generated. As a result, the motor and optional encoder position status' are cleared.

The position feedback value is only active if an optional encoder is available and evaluated and if **S-0-0391, Monitoring window feedback 2** is not parameterized with a 0.

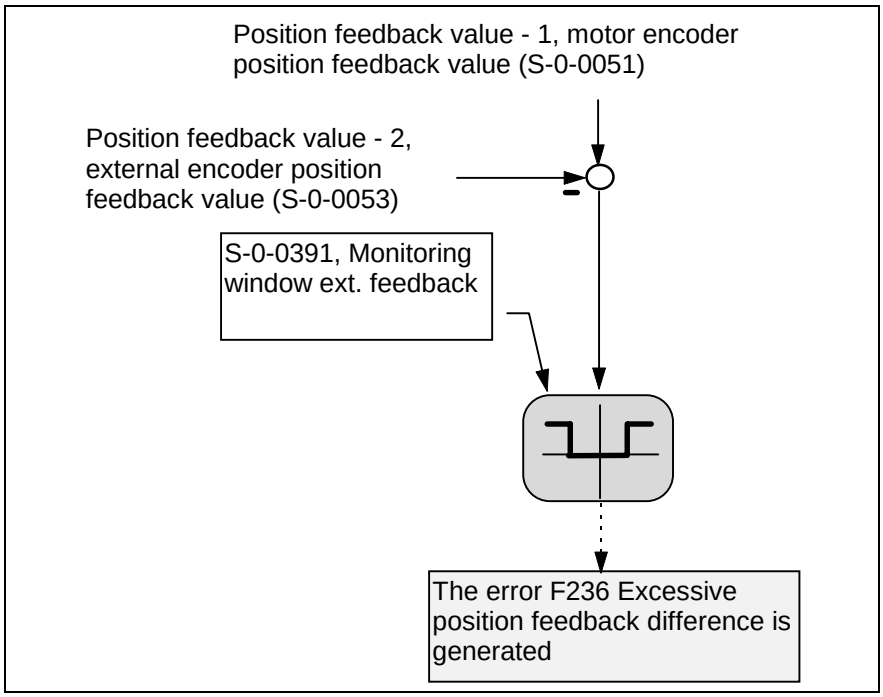

Position feedback value - 1, motor encoder position feedback value (S-0-0051)
Position feedback value - 2, external encoder position feedback value (S-0-0053)
S-0-0391, Monitoring window ext. feedback
The error F236 Excessive position feedback difference is generated

Fig. 8-21: Position feedback value monitoring schematic

Setting the Position Feedback Monitoring Window

The requirements for setting the position feedback value monitor are:

- All drive regulator loops must be set correctly.
- The axis mechanical system must be in its final form.
- The axis must be homed.

The monitoring window must be determined according to the application. The following basic procedure is recommended for doing this:

- Run a typical operating cycle. While doing this, set the planned acceleration and velocity data of the axis.
- Enter progressively smaller values in the parameter **S-0-0391, Monitoring window feedback 2** until the drive gives the error message **F236 Excessive Position Feedback Difference**. Depending on the mechanical system, you should start with 0°-20° and decrease the window in steps of 0,5°... 1°.
- The value at which the monitor is triggered should be multiplied with a tolerance factor of 2 ... 3 and entered in parameter **S-0-0391, Monitoring window feedback 2**.

When determining the monitoring window, make sure that the position feedback monitor works dynamically. This means that even dynamic deviations of both position feedback values in acceleration and braking phases are registered. This is why it is not enough to use statical axis errors as the basis for the setting.

Deactivating the Position Feedback Monitor

It is possible to turn off the position feedback monitor in applications where the optionally connected measurement system does not control the axis position but is used for other measurements. To do this, enter 0 in the parameter **S-0-0391, Monitoring window feedback 2**.

Other Optional Encoder Characteristics

To parameterize any other characteristics of the optional encoder, such as

- Direction of movement not-inverted/inverted
- Absolute evaluation possible
- Absolute evaluation activated

use **S-0-0115, Position feedback 2 type**

The structure of this parameter is as follows:

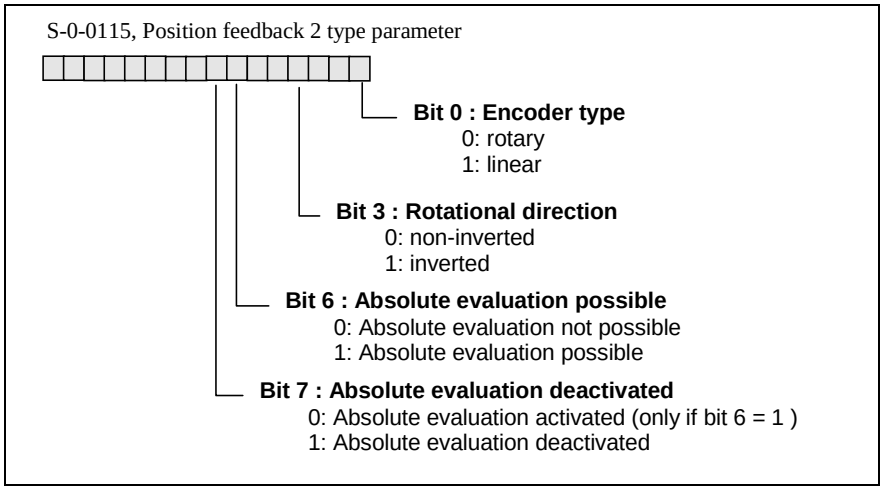

S-0-0115, Position feedback 2 type parameter
Bit 0 : Encoder type
0: rotary
1: linear
Bit 3 : Rotational direction
0: non-inverted
1: inverted
Bit 6 : Absolute evaluation possible
0: Absolute evaluation not possible
1: Absolute evaluation possible
Bit 7 : Absolute evaluation deactivated
0: Absolute evaluation activated (only if bit 6 = 1)
1: Absolute evaluation deactivated

Fig. 8-22: Parameter S-0-0115, Position feedback 2 type

The bits in the position encoder type parameter are partly set or cleared by the drive itself. There is following dependency:

- Depending on the absolute encoder range and the maximum travel range or modulo value, bit 6 is either set or cleared.

(See also "Other Settings for Absolute Measurement Systems".)

Actual Feedback Values of Non-Absolute Measurement Systems After Initialization

If there is no absolute measuring system then the initialization value can be changed via parameter **P-0-0019, Position start value**.

It hereby applies:

If the parameter is write accessed in either phase 2 or 3 then this value is assumed as the initialization value:

P-0-0019 written:	Position feedback value 1	Position feedback value 2
no	init. motor encoder raw value	init. motor encoder raw value
yes	position start value	position start value

Fig. 8-23: Non-absolute measurement system position feedback values after initialization

Warning

No valid position feedback values exist before the measurement system is initialized.
Initialization is performed during the transition check for communication phase 4.

Some measurement systems have limitations concerning the maximum velocity during their initialization.

Measurement system	Maximum initialization velocity
DSF/HSF	300 rpm
EnDat	Initialization should occur at standstill
Multiturn resolver	300 rpm

Fig. 8-24: Velocity allowed during initialization

Drive-internal format of position data

There are two different formats in the drive used to display position data. We differentiate between

- **display format** and
- **drive-internal format**.

The **display format** defines the unit, i.e., the LSB value with which the position data are exchanged between drive and control/surface. When a position data parameter such as, **S-0-0051, Position feedback 1 value** is read, it is sent in this format to the control. The display format is set with parameter **S-0-0076, Position Data Scaling Type** and **S-0-0079, Rotational position resolution**. The control generally sets the format.

(See also "Physical Values Display Format“.)

The drive-internal positon resolution depends on the travel range to be described

The **drive-internal format** determines the LSB value, the position command and feedback value editing as well as how the position control loop in the drive is performed. The drive uses the value of parameter **S-0-0278, Maximum travel range** to calculate the drive-internal format.

Note: If the value set in **S-0-0278, Maximum travel range** is used as set at delivery, then the drive-internal format generally meets most demands given a sufficiently high resolution. Only if excessively high demands are made of the drive-internal format of the position data or with very long travel ranges it becomes necessary to optimize the setting.

Functional principle of the drive-internal position data formats

Position data processing in the drive has a constant data width from which the resolution of the position data to cover the travel range of the axis depends.

It applies:

Note: The longer the distance to be represented, the smaller the drive-internal position resolution.

These parameter values are used to compute the **drive-internal resolution**:

- **S-0-0116, Feedback 1 Resolution** and
- **S-0-0256, Multiplication 1**.

The parameters for the encoder resolution are listed in the data sheets of the measuring system or they are automatically read out of the feedback memory if such a measuring system is present. The number of lines per encoder revolution is set there. The parameter values for the multiplication are calculated by the drive during command **S-0-0128, C200 Communication phase 4 transition check**. They describe the resolution per division period (dp).

It thus applies for the drive-internal resolution:

$$\text{Resolution} = \text{encoderresolution} \times \text{multiplication}$$

Resolution:	drive-internal resolution of position data [Incr/rev]
multiplication:	value in S-0-0256 or S-0-0257 [Incr/dp]
encoder resolution:	value in S-0-0116 or S-0-0117 [dp/Incr]

Fig. 8-25: Drive-internal resolution of rotary motors

Examples:

MKD motor, S-0-0116 = 4, S-0-0256 = 32768, therefore: drive-internal resolution = 131072 increments/motor revolution, therefore, an LSB value of 0.00275 degrees.

Note: The value for the multiplication is limited to
4 .. 4194304
for technical reasons.

Setting the drive-internal position data format

To set the drive-internal resolution, use the parameter

S-0-0278, Maximum travel range.

Setting the maximum travel range at start-up

This parameter must be set at the time where an axis is commissioned to a value that equals at least the distance that the axis must travel. While executing the command **S-0-0128, C200 Communication phase 4 transition check,** the drive computes the values for **S-0-0256, Multiplication 1** and, if an optional measuring system is mounted, for **S-0-0257, Multiplication 2** as well. These parameters thus help to display the resolution.

Multiplication is only reduced if the travel range can no longer be described

The maximum possible resolution of the position feedback value of a position encoder for technical reasons equals 32768 increments per division period of the measuring system. This maximum resolution is only reduced if the travel range is set so large that it can no longer be described with the maximum resolution.

To compute the **multiplication**, the following calculations are conducted in the command **S-0-0128, C200 Communication phase 4 transition check**:

$$\text{multiplication} = \frac{2^{31}}{\text{travel range} \times \text{encoder resolution}}$$

travel range:	travel range shown in encoder revolutions
multiplication:	value in S-0-0256 or S-0-0257
encoder resolution:	value in S-0-0116 or S-0-0117

Fig. 8-26: Relationship between maximum travel range and multiplication with rotary measuring systems

Examples:

1. MHD motor with S-0-0116 = 512, maximum travel range 2048 motor revolutions, therefore, a multiplication of 2^31 / (2048 • 512) = 2048.
2. MHD motor with S-0-0116 = 512, maximum travel range 20 motor revolutions, therefore, a multiplication of 2^31 / (20 • 512) = 209715. The next higher value equals 32768, thus a multiplication = 32768.

Note: When computing multiplication always use the next lower binary value of the precise results.

Drive internal representation of position data when an optional encoder is present

If an optional encoder is mounted, the multiplication of the motor encoder is guided by the optional encoder

If there is an optional measuring system, then the multiplication of this encoder is computed as per the above formula in terms of the travel range set. The multiplication of the motor encoder is calculated so that it also covers this travel range. This means that values exceeding 32768 can be generated depending on the mechanical transformation elements!

Example: MKD motor with rotary optional encoder

motor encoder resolution	= 4
optional encoder resolution	= 1000
travel range	= 50 revolutions
gear ratio	= 1:1

1. Calculating the multiplication of the optional encoder:

2^31 / (1000 • 50) = 42949, technical maximum 32768, thus S-0-0257 = 32768.

This results in a resolution of 0.00001098 Degrees.

2. Calculating the multiplication of the motor encoder

2^31 / (4 • 50) = 10737418, the next smaller binary value = 8388608, thus S-0-0256 = 8388608. However, the technical maximum resolution is 4194304. Therefore, we set the value in S-0-0256 to 4194304. The resolution is 0.0002146 Degrees.

The resolution can never exceed 4194304 * S-0-0116!

Processing format of the drive-internal position command interpolator

In the drive-internal position command interpolator, the position command profile for the drive-controlled travel commands such as drive halt, drive-controlled homing, operating mode drive-internal interpolation and so on are generated. The format of the drive-internal position data affect the maximum acceleration limit which can be pre-defined for the interpolator.

The limits are not valid for cyclic command values, e.g. in operation mode Position control.

The following relationships apply:

$$amax = \frac{51.471.854.040}{\text{encoder resolution} \times \text{multiplication}} \left[\frac{rad}{s^2}\right]$$

amax: maximum acceleration of position command of the interpolator
encoder resolution: value in S-0-0116
multiplication: value in S-0-0256

Fig. 8-27: Maximum acceleration of the position command interpolator as dependent on the drive-internal position data format

Example:

MHD motor with S-0-0116 = 512, multiplication = 32768, equalling a maximum acceleration of the position command interpolation of 3067 rad/s².

8.3 Other Settings for Absolute Measurement Systems

Encoder types and relevant interfaces

The following table illustrates which absolute measuring system can be used as motor or optional encoder. Listed aso is the encoder interface that is recommended.

Meßsystem:	Module (no.):	as motor encoder:	as optional encoder:
Single/multiturn DSF	Standard(1)	yes	yes
Single/multiturn DSF	DFF01.1U(4)	no	yes
Single/multiturn resolver	Standard(1)	yes	no
SSI-Geber mit 4096 Inkr/Umdr	DAG01.2U(7)	no	yes
Single/Multiturn- Rotary encoder from Heidenhain with EnDat interface	DAG01.2U(8)	yes	yes

Fig. 8-28: Modules needed for absolute measuring systems

Absolute encoder range and absolute encoder evaluation

Motor and/or optional encoders can be used as absolute encoders

As motor and/or optional measuring system those measuring systems can be used that supply absolute position information within one or several revolutions (single or multiturn encoder) or a within a specific traversing distance (absolute linear scales).

The information about which range (absolute encoder range) a measuring system can supply absolute position information about is stored in the ata memory of the measuring system or the drive software. Absolute measuring systems do not have to be homed after initialization of the drive firmware. The actual position value lies within the absolute encoder range, machine zero related, after initialization. It is only necessasry to conduct a single setup procedure (setting absolute dimension).

Whether a motor or an optional measuring system are to be evaluated as encoders, depends on the following variables:

- the absolute encoder range (**S-0-0378, Absolute encoder 1, range / S-0-0379, Absolute encoder 2, range)** of the relevant encoder.
- the set position scaling (position data represented absolute or in modulo formats) in **S-0-0076, Position data scaling type**
- the travel range set in **S-0-0278, Maximum travel range** or
- the modulo value set in parameter **S-0-0103, Moduleo value.**

Note the following relationships:

Position scaling (Bit 6 of S-0-0076)	S-0-0278, Max. travel range	S-0-0103, Moduleo value	Absolute encoder evaluation possible
Absolute format	<= ½ * S-0-0378 / S-0-0379	not relevant	yes
	> ½ * S-0-0378 / S-0-0379	not relevant	no
Modulo format	S-0-0103	<= S-0-0378/S-0-0379	yes
	S-0-0103	> S-0-0378/S-0-0379	no

Fig. 8-29: Absolute encoder evaluation as depends on position format, modulo format and maximum travel range

The check whether a measuring system can be evaluated as an absolute system is conducted during command **S-0-0128, C200 Communication phase 4 transition check**. The results are displayed in bit 6 of the relevant position encoder type parameter (S-0-0277 / S-0-0115).

Activating the absolute encoder evaluation

If the absolute evaluation of a measuring system is possible but not wanted, this can be deselected in bit 7. The measuring system is then treated as if it were a non-absolute (single turn) encoder.

The position encoder type parameter is structured as follows:

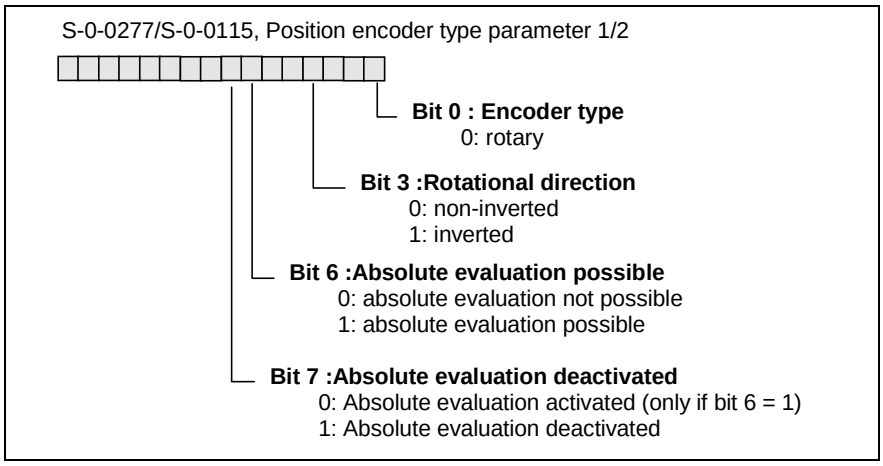

S-0-0277/S-0-0115, Position encoder type parameter 1/2
Bit 0 : Encoder type
0: rotary
Bit 3 :Rotational direction
0: non-inverted
1: inverted
Bit 6 :Absolute evaluation possible
0: absolute evaluation not possible
1: absolute evaluation possible
Bit 7 :Absolute evaluation deactivated
0: Absolute evaluation activated (only if bit 6 = 1)
1: Absolute evaluation deactivated

Fig. 8-30: Structure of the position encoder type parameter

Pre-requisites for correctly generating absolute position information:

The correct generation of the machine zero-point related actual position value is only possible if the relevant conditions have not changed. Only then can the measurement-system related absolute position information of the machine zero point related actual position value be determined out of command **S-0-0128, C200 Communication phase 4 transition check.** The conditions for the correct conversion of the measurement system related position information in the machine zero point related actual position value are made up of:

Monitoring absolute encoder evaluation conditions

- the rotational direction of the measuring system set in parameters **S-0-0277, Position feedback 1 type** or **S-0-0115, Position feedback 2 type** in bit 3
- the position polarity set in **S-0-0055, Position polarities**
- the multiplication determined based on **S-0-0278, Maximum travel range** displayed in parameters **S-0-0256, Multiplication 1** or **S-0-0257, Multiplication 2**.

If one of these three conditions changes, then the position status of the relevant measuring system is cleared (**S-0-0403, Position feedback value status** = "0“) and the error **F276 Absolute encoder out of allowed window** is generated.

Absolute Encoder Monitoring

If the absolute evaluation of a measuring system has been activated (position encoder type parameter S-0-0277 or S-0-0115 = 01xx.xxxxb), then in command **S-0-0128, C200 Communication phase 4 transition check** the actual position value is generated and monitored. The monitoring of the actual position value is only active if the encoder is in reference.

Functional principle of the absolute encoder monitor

When turning off the drive's power supply, the current actual position of the axis is loaded into resident memory. When switching the axis back on, the difference of the stored position and the newly initialized position of the measuring system is built. If this difference is greater than the parameterized position window in parameter **P-0-0097, Absolute encoder monitoring window**, the error message **F276 Absolute encoder out of allowed window** is given.

Note: The monitor is deactivated if 0 is parametrized in **P-0-0097, Absolute encoder monitoring window**.

The absolute encoder monitor is appropriate for the following applications:

- The motor is equipped with a holding brake.
- The drive mechanical system is self-locking and cannot be moved manually.

Note: If two absolute measuring system are mounted (motor and optional encoder) then the monitor is only set to the encoder selected with bit 3 of **S-0-0147, Homing parameter**.

Setting the Absolute Encoder Monitor

The absolute encoder monitoring window must be set by the user. Always select greater than the maximum allowable motion of the axis when shutdown. Assuming that the axis has a brake or is self-locking, you can enter 0.1 motor revolutions (36° in reference to the motor shaft) as a standard value for the parameter **P-0-0097, Absolute encoder monitoring window**.

Absolute encoder monitoring with two absolute encoders

If there are absolute measuring systems and the absolute encoder monitor of the position data is activated, then the following restriction applies:

If both motor and optional encoder are evaluated absolutely, then only that one is monitored as an absolute encoder that has been set in bit 3 of parameter **S-0-0147, Homing parameter**.

See also chapter: absolute encoder monitoring.

Deactivating the Absolute Encoder Monitor

The absolute encoder monitor cannot be effectively used with axis that can or must be moved manually when switched off. The absolute encoder monitor should be turned off in such situations in order to prevent unnecessary error conditions.

The absolute encoder monitor can be turned off by writing 0 to P-0-0097.

Moduleo Analysis of Absolute Measurement Systems

If measuring systems are evaluated absolutely and modulo evaluation of the position data is activated, then the following restrictions apply:

If both motor encoder and optional encoder are to be evaluated absolutely, then only that one is evaluated as an absolute encoder, which is set in bit 3 of parameter **S-0-0147, Homing parameter**.

(See also chapter: "Modulo Feature").

Actual Feedback Values of Absolute Measurement Systems After Initialization

The condition of the position feedback values of the motor feedback and, if available, of the optional feedback after initializing the position feedback values in the command **S-0-0128, C200 Communication phase 4 transition check** depends on:

- Bit 3 in **S-0-0147, Homing parameter**
- Availability of an absolute feedback as the motor or optional feedback.

Motor feedback:	Optional feedback:	S-0-0147 Bit 3:	S-0-0051, Position feedback value 1:	S-0-0053, Position feedback value 2:	S-0-0403, Pos. status:
absolute	not absolute	0	absolute value of motor feedback	absolute value of motor feedback	1
absolute	not absolute	1	absolute value of motor feedback	absolute value of motor feedback	0
not absolute	absolute	0	absolute value of optional feedback	absolute value of optional feedback	0
not absolute	absolute	1	absolute value of optional feedback	absolute value of optional feedback	1
absolute	absolute	arbitrary	absolute value of motor feedback	absolute value of optional feedback	1

Fig. 8-31: Position feedback values of absolute measurement systems after initialization

Note: Absolute position is lost with changes in polarity, scaling, gearbox and so on.

8.4 Drive Limitations

Current Limit

The current limit limits the command current to the parameters

- **P-0-4046, Active peak current** or
- **P-0-4045, Active permanent current**

The active continuous current designates the current that can be continuously taken from the drive, whereas the active peak current is only available for short periods of time.

If the peak current is demanded from the drive for longer periods of time, the drive controller's internal thermal load monitor will make sure that the allowable output current is reduced from the active peak current to the active continuous current.

Setting the Active Peak Current

The parameter **P-0-4046, Active peak current** may not be set separately, but is instead a result of the following parameters:

- **S-0-0110, Amplifier peak current**
- **S-0-0109, Motor peak current**
- **P-0-4004, Magnetizing current**
- **S-0-0092, Bipolar torque/force limit value**
- **P-0-0109, Torque/force peak limit**
- **P-x-1292, Switchable torque limit value**

In addition:

- The allowable peak amplifier current is limited to the **S-0-0109, Motor peak current**, if this is smaller.
- As the process continues, the value determined in the step before is reduced in connection with **P-0-4004, Magnetizing current**. The magnetizing current is 0 if there is a synchronous motor.
- Limit to the smalles possible value in
  P-0-0109, Torque/force peak limit,
  S-0-0092, Bipolar torque/force limit value
  and
  P-X-1292, Switchable torque limit value
  (See also chapter: Torque/Force Limiting)
- Dynamic reduction during operation by monitoring the thermal load of the drive controller. (See also chapter: "Monitoring the Thermal Load")

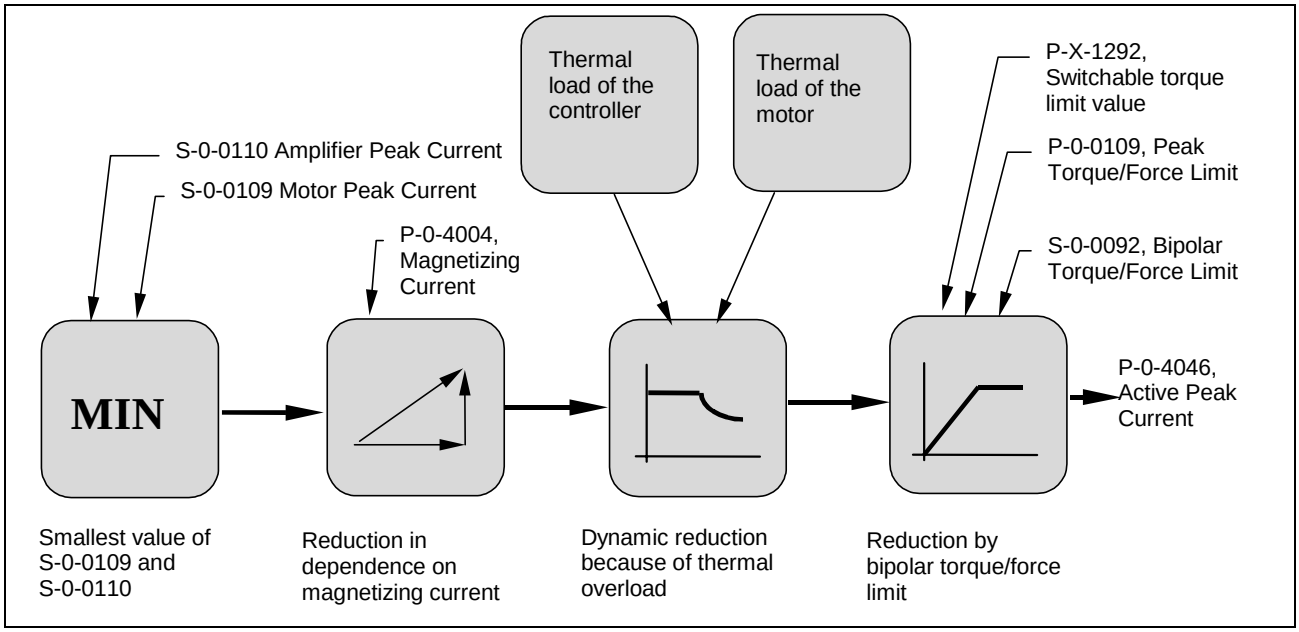

Thermal load of the controller
Thermal load of the motor
P-X-1292, Switchable torque limit value
S-0-0110 Amplifier Peak Current
S-0-0109 Motor Peak Current
P-0-4004, Magnetizing Current
P-0-0109, Peak Torque/Force Limit
S-0-0092, Bipolar Torque/Force Limit
MIN
P-0-4046, Active Peak Current
Smallest value of S-0-0109 and S-0-0110
Reduction in dependence on magnetizing current
Dynamic reduction because of thermal overload
Reduction by bipolar torque/force limit

Fig. 8-32: Determining the torque-producing peak current

Setting the Active Continuous Current

The content of the parameter **P-0-4045, Active permanent current** is a result of the following parameters:

- **P-0-4011, Switching frequency**
- **P-0-4004, Magnetizing current**
- **P-0-4046, Active peak current**

To obtain this:

- The corresponding continuous current is determined from the selected switching frequency via the applicable drive controller data.
- As the process continues, the value determined under 1. is reduced in connection with **P-0-4004, Magnetizing current**. The magnetizing current is 0 if there is a synchronous motor.
- The determined value is limited to the **P-0-4046, Active peak current**.

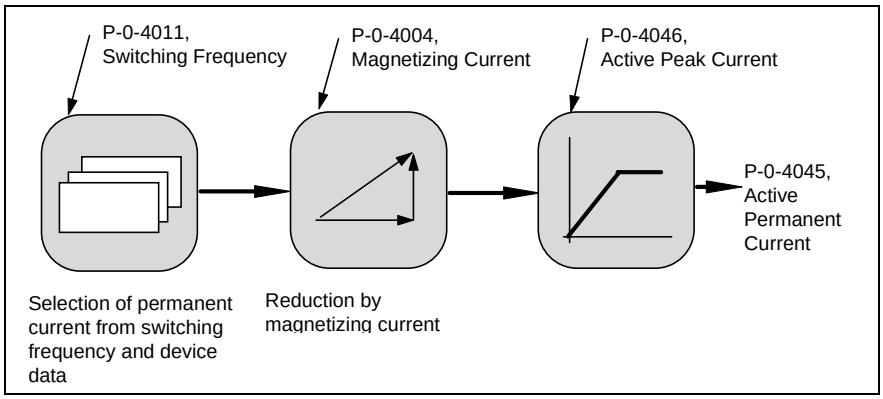


Fig. 8-33: Setting the active continuous current

Monitoring the Thermal Load of the drive controller

The thermal drive controller load indicates how much the drive controller's power stage unit is loaded by the delivered command current. To do this, information from the

- drive controller specific data ,
- the command current profile and
- the selected switch frequency

is used to continually calculate the power transistors' chip overtemperature. This may not become greater than the allowed chip overtemperature. If this condition is reached, the control drive will react by dynamically reducing the command current.

(See also chapter: Setting the Active Peak Current on page 8-36.)

The drive controller will generate the warning **E257 Continuous current limit active**.

For diagnostic purposes, a warning threshold can be set with **P-0-0127, Overload warning**. For practical purposes, a value of 80% thermal load is parameterized here. This value should not be exceeded during normal drive operation. If the thermal load exceeds the value parameterized in **P-0-0127, Overload warning**, the drive controller will generate the warning **E261 Continuous current limit prewarning**.

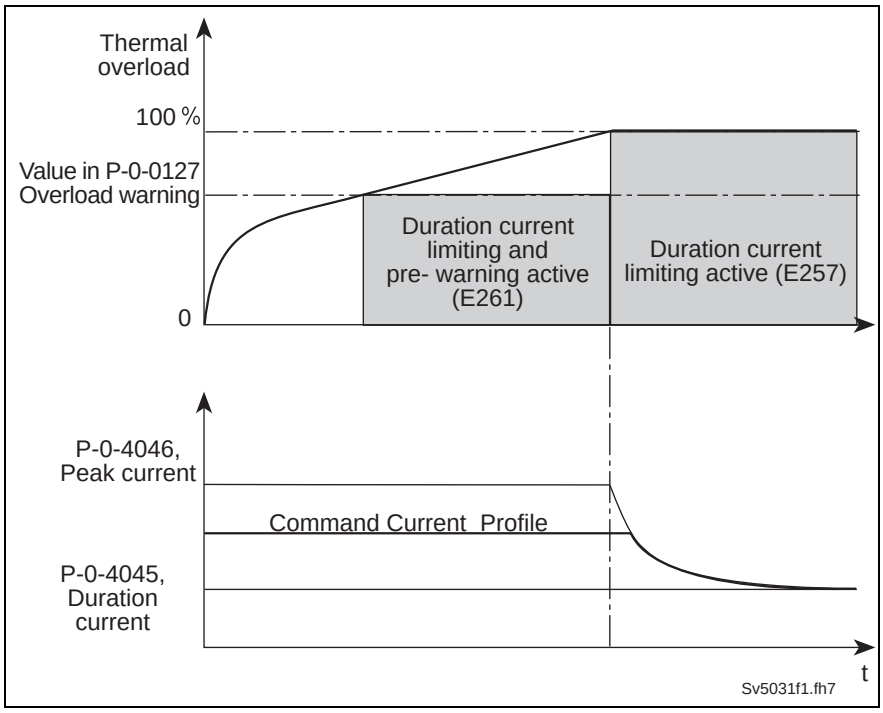


Fig. 8-34: Monitoring the thermal load and continous current limit

Checking the Thermal Load of the drive controller

The parameter **P-0-0141, Thermal drive load** is for diagnostic purposes. In this parameter, 0% corresponds to a chip overtemperature of 0 Kelvin, 100% corresponds to the maximum chip overtemperature. The thermal load should not exceed a value of 80% for the applied operating cycles if the drive is set up correctly. It typically takes about 10 minutes to warm up a drive controller's power stage to its final temperature. To check the thermal load of a drive during installation without having to run operating cycles during this period of time, the drive controller load can be preset with 80%. This can happen by writing an arbitrary value to the parameter **P-0-0141, Thermal drive load**. A typical operating cycle must be simultaneously run for a short while. The thermal load should be observed while this is being done, and it should show a falling tendency. Otherwise the drive is incorrectly set up for the application. To check the thermal load for further increase above 80%, the

- Overload warning by means of **P-0-0127, Overload warning** and/or
- the output of the thermal load at the analog output

may be used. The following illustration shows the typical process of the thermal load, as it can be observed by means of the analog output. During the execution of an operating cycle, the load is preset with 80% by writing to P-0-0141.

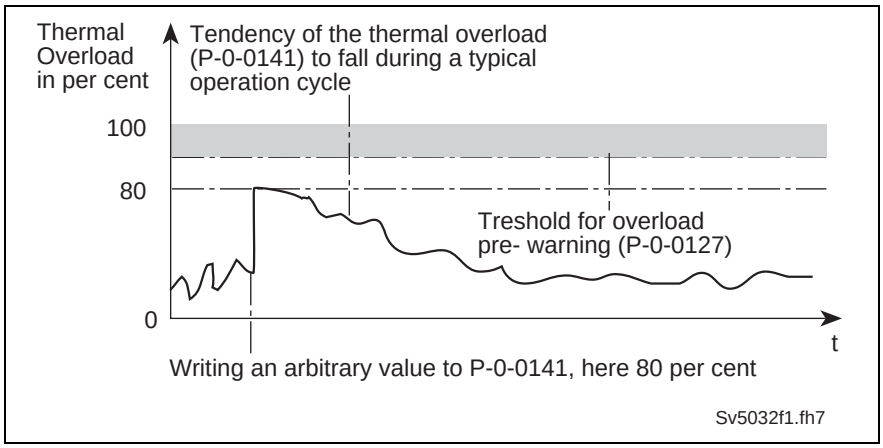


Fig. 8-35: Checking the Thermal Load

Monitoring of the thermal Motor Load

The motor may be loaded with 4 times the **S-0-0111, Motor current at standstill** for 400 ms. The permanently permissible current is 2.2 times that value. If the motor overload limit is active, then the warning **E225 Motor overload** is generated, and the bit 0 (overload warning) is set in **S-0-0012, Class 2 diagnostics**. The limited peak current is displayed in **P-0-4046, Active peak current**.

Torque/Force Limiting

The maximum allowable torque can be limited by the user with the parameters

- **S-0-0092, Bipolar torque/force limit value**
- **P-0-0109, Torque/force peak limit**
- **P-x-1292, Switchable torque limit value**

These parameters determine what percentage of **S-0-0111, Motor current at standstill** is made available to the user.

The parameter **S-0-0092, Bipolar torque/force limit value** is designed to allow variable limits of the maximum drive torque to values smaller than the maximum allowable drive torque while it is in operation. This is useful when temporarily moving toward a positive stop, for example.

S-0-0092 is always at 400% after the drive has been switched on. A variable input of a value in S-0-0092 läßt can be implemented with the "Analog input" function.

Each drive produces a specific peak torque based on the maximum allowable current of the applicable motor/drive controller combination, which is desirable for acceleration procedures in many applications. Nevertheless, there are times when the maximum peak torque must be limited to lesser values for technical reasons specific to an application. The maximum peak torque of a drive can be limited as appropriate for an application with the parameter **P-0-0109, Torque/force peak limit**. The parameter overrides everything else to ensure that the maximum peak torque allowed for the application cannot be exceeded even if **S-0-0092, Bipolar torque/force limit value** is set arbitrarily high.

The maximum output current is thus determined together with the current limit, which is displayed in **P-0-4046, Active peak current.**

(See also: Current Limit)

The following illustration shows the connection between the current limit and the torque/force limit of the maximum allowed torque in determining the maximum output current.

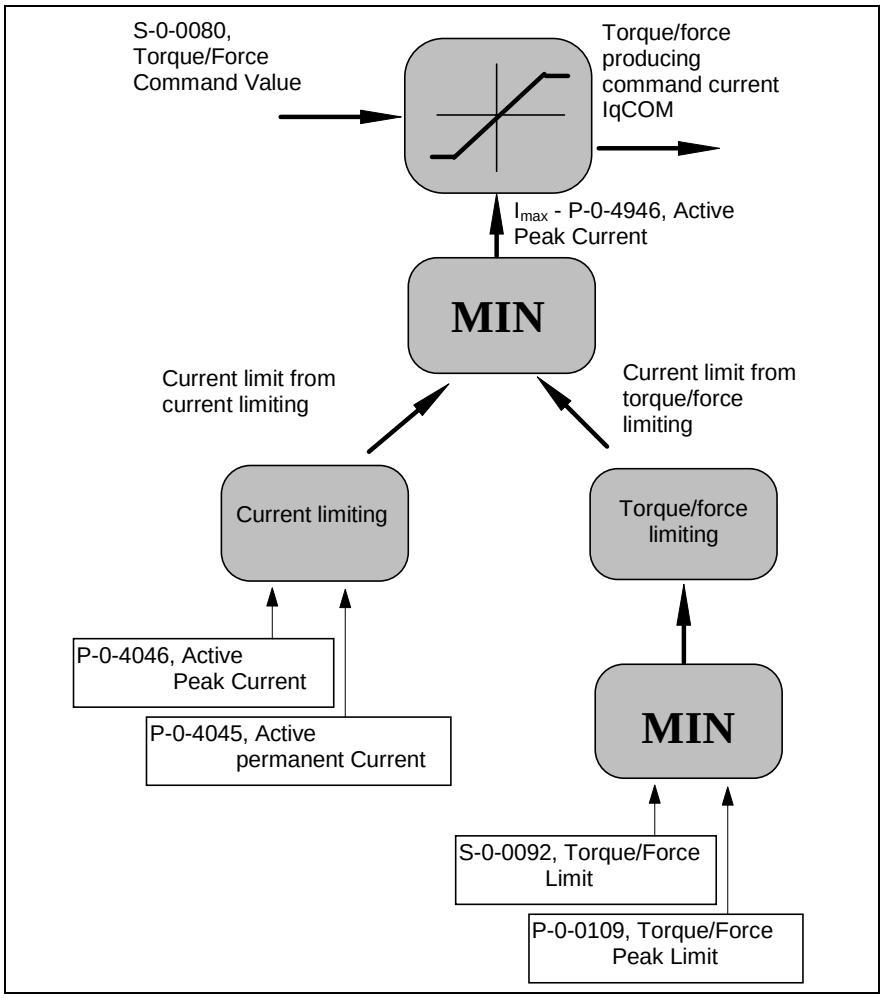


Fig. 8-36: Current limitation and torque/force limitation

The current limit and the torque/force limit both affect the torque-producing command current limit.

The active value is always the smaller value of

- Current limit value from current limitation
- Current limit value from torque/force limitation

This is displayed in the parameter **P-0-4046, Active peak current.**

Switchable torque limits

With switchable torque limits torque limits can be specifically switched on and off via a circuit input. An individual limit value can be parametrized in each parameter block.

Parametert

- **P-x-1292, Switchable torque limit value**

is used in this case.

The existing limits set in parameters

- **S-0-0092, Bipolar torque/force limit value**

and

- **P-0-0109, Torque/force peak limit**

remain active.

Actuating the switchable torque limits

If input MD-RED on DEA04.2M = 24 volts, then the internal torque command value is additionally limited with the value in **P-x-1292, Switchable torque limit value**.

P-x-1292 is in every parameter block at least once.

Level at MD-RED	Active parameter block	Limit with P-x-1292
0 Volt	irrelevant	none
24 Volt	0 to 3	P-0-1292 to P-3-1292

Fig. 8-37: Switchable torque limits that can be selected

Parametrizing the switchable torque limits

Data contents	Comments:
z. B. P-0-1292 = 10% P-1-1292 = 20% P-2-1292 = 30% P-3-1292 = 40%	Torque command value with active parameter block 0 to 10%, at 1 to 20%, at 2 to 30% or at 3 to 40 % limited if MD-RED is active

Fig. 8-38: Data contents P-x-1292

Limiting Velocity

The following parameters limit the velocity of the drive:

- **S-0-0113, Maximum Motor Speed (nmax)**
- **S-0-0091, Bipolar Velocity Limit Value**

To limit a velocity command value use the following parameters:

- **P-0-1111, Switchable velocity limit 1**
- **P-0-1112, Switchable velocity limit 2**
- **P-0-1113, Switchable velocity limit 3**
- **P-0-1114, Switchable velocity limit 4**
- **P-0-1115, Switchable velocity limit 5**
- **P-0-1116, Switchable velocity limit 6**
- **P-0-1117, Switchable velocity limit 7**

Parameter **S-0-0113, Maximum motor speed (nmax)** designates the maximum possible velocity of the motor. It is in MHD, MKD and MKE motors in the motor feedback data storage and does not have to be input. With other motor types it is necessary to use the value listed in the parameter sheet for the motor.

Parameter **S-X-0091, Bipolar Velocity Limit Value** is used to enable variable limits of the maximum velocity during operation to values smaller than the maximum possible ones.

Using parameters **P-0-1111, Switchable velocity limit 1** to **P-0-1117, Switchable velocity limit 7** it is possible to specifically pre-select maximum values via the circuit inputs to limit the velocity command value.

Limiting to Maximum Motor Velocity

The maximum motor velocity defines the maximum velocity of the drive. It becomes active and is included in the calculation of

- the maximum value entered in the parameter **S-X-0091, Bipolar Velocity Limit Value**

Limiting to Bipolar Velocity Limit Value

The bipolar velocity limit value defines the maximum velocity of the drive for the user. It becomes active as

- the monitor of the encoder velocity in the **torque control** operating mode
- the limit for the resulting command value in the velocity controller
- the monitor of the position command value difference in the **position control** operating mode (see also "position command value monitoring")
- the limit of **S-0-0036, Velocity Command Value** in the **velocity control** operating mode

Monitoring the Feedback Velocity in the Torque Control Operating Mode

Monitoring the Feedback Velocity in the **Torque Control** operating mode occurs at 1.125 times the value of **S-X-0091, Bipolar Velocity Limit Value**. If this value is exceeded, the fatal error

- **F879 Velocity limit S-X-0091 exceeded**

is generated. The drive switches to torque-free operation afterwards.

Limiting to switchable limit values

Programmable velocity limits can be activated via circuit inputs LIMIT1 to LIMIT4. If one of the inputs LIMIT1 to LIMIT4 on DEA04.2M = 24 volts, then the command velocity is limited to the selected value.

Level at LIMIT1	Level at LIMIT2	Level at LIMIT4	Active LIMIT value
0 Volt	0 Volt	0 Volt	none
24 Volt	0 Volt	0 Volt	**P-0-1111, Switchable velocity limit 1**
0 Volt	24 Volt	0 Volt	**P-0-1112, Switchable velocity limit 2**
24 Volt	24 Volt	0 Volt	**P-0-1113, Switchable velocity limit 3**
0 Volt	0 Volt	24 Volt	**P-0-1114, Switchable velocity limit 4**
24 Volt	0 Volt	24 Volt	**P-0-1115, Switchable velocity limit 5**
0 Volt	24 Volt	24 Volt	**P-0-1116, Switchable velocity limit 6**
24 Volt	24 Volt	24 Volt	**P-0-1117, Switchable velocity limit 7**

Fig. 8-39: Switchable velocity selected can be selected

Parametrizing the switchable velocity limit

Parameters P-0-1111 to P-0-1117 are only in parameter block 0. The desired limit velocities must be entered here.

- **P-0-1111, Switchable velocity limit 1**

to

- **P-0-1117, Switchable velocity limit 7**

Data inhalt:	Comments:
e.g. P-0-1111 = 1000 rpm P-0-1112 = 2000 rpm P-0-1113 = 3000 rpm P-0-1114 = 4000 rpm P-0-1115 = 5000 rpm P-0-1116 = 6000 rpm P-0-1117 = 7000 rpm	The velocity limits are limited with LIMIT 1 at 1000 rpm, 2 at 2000 rpm, 3 at 3000 rpm, 4 at 4000 rpm, 5 at 5000 rpm, 6 at 6000 rpm, or 7 at 7000 rpm.

Fig. 8-40: Data content P-0-1111 to P-0-1117

Call back of the switchable velocity limits

The output N>LIMIT on DEA04.2M signals whether the motor speed has not reached or exceeded a velocity limit.

Output N=LIMIT on DEA04.2M signals whether the motor speed lies within the velocity window of the selected LIMIT velocity.

Has a LIMIT input been selected?	Current motor speed	Level at N<LIMIT	Level at N=LIMIT
no	is smaller than maximum speed (**S-x-0091, Bipolar velocity limit value**)	24 Volt	0 Volt
irrelevant	is greater than maximum (**S-x-0091, Bipolar velocity limit value**)	0 Volt	0 Volt
yes	is smaller than LIMIT speed minus **S-x-0157, Velocity window**	24 Volt	0 Volt
yes	is within **S-x-0157, Velocity window** around LIMIT speed	0 Volt	24 Volt
yes	is greater than LIMIT speed plus **S-x-0157, Velocity window**	0 Volt	0 Volt

Fig. 8-41: Call back speed limit

Limiting the Resulting Command Value in the Velocity Controller

In all operating modes in which the velocity controller is active (all operating modes except for **Torque Control**), the given velocity command value is limited to the value of **S-X-0091, Bipolar Velocity Limit Value**. If this condition is reached, the warning

- **E259 Command Velocity Limit active**

is generated.

Limiting S-0-0036, Velocity Command Value in the Velocity Control Operating Mode

In the velocity control operating mode, the input of **S-0-0036, Velocity Command Value** is limited to **S-X-0091, Bipolar Velocity Limit Value**. If the value entered in S-0-0036 exceeds this limit, the warning

- **E263 Velocity command value > limit S-0-0091**

is generated.

8.5 Drive Error Reaction

The error response depends on the current error class.

If an error is recognized in the drive controller, a preset error response occurs.

This drive error response depends on

- the error class of the current error

and the setting of the parameters

- P-0-0117, NC Reaction on Error
- P-0-0118, Power off on Error
- P-0-0119, Best Possible Deceleration

Note: The error class determines whether the reaction parametrized as above can be done in case of error or not.

There are 4 error classes, which have different priorities.
(see also "Error Classes")

Error Class	Diagnostic Messages	Drive Response
Fatal	F8xx	The error response parameter settings in **P-0-0117, Activation of NC Response During an Error** and **P-0-0119, Best Possible Deceleration** will be ignored, since a driver response is impossible. Torque/force is instantly cut off.
Travel range	F6xx	Independently from the settings in parameters **P-0-0117, NC Reaction on Error** and **P-0-0119, Best possible deceleration**, the velocity command value is immediately set to zero. This response corresponds to the setting P-0-0117 = 0 (no NC Reaction) P-0-0119 = 0 (Velocity Command Value Reset). This setting provides the fastest stop of the axis if the drive range is exceeded.
Interface	F4xx	A response from the control is impossible, since the communication to the control became inoperative. The drive proceeds instantly with **P-0-0119, Best possible Deceleration**.
Non-fatal	F2xx	The drive conducts the decel procedure set in **P-0-0117, NC reaction on error** and **P-0-0119, Best possible deceleration.** If NC reaction is set as an error response, then the drive continues to operate for 30 seconds after detecting an error, as if no error had been detected. The NC has this time to bring the axis to a controlled standstill. The drive then conducts the response set in P-0-0119.

Fig. 8-42: Error Response of the Drive

Velocity Command Value Reset

Best possible standstill P-0-0119 = 0

Given an error, the drive will stop with command value = 0. The drive stops with its maximum permissible torque.

(See also section: "Current Limit".)

Failure reaction sequence with spindle brake present

The procedure for the motor brake activation (if mounted) and the power stage enable with velocity command value deceleration to zero (with spindle brake) are displayed below.

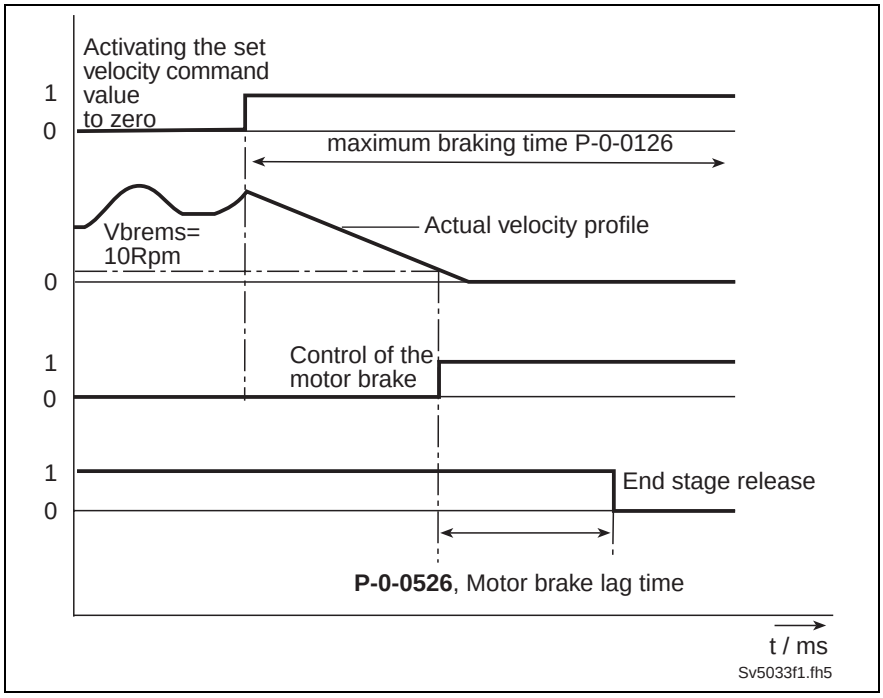


Fig. 8-43: Time sequence of the velocity command value reset

Note: Activation of the motor holding brake depends on **P-0-0525,** bit 1.
See section: "Motor Holding Brake“

Note: If the value entered in P-0-0126 is too small, then the error reaction could be terminated without axis standstill.

WARNING

If **P-0-0126, Maximum braking time** is set too low:
Danger of damaging the motor brake
⇒ The value for **P-0-0126, Maximum braking time** must always be set higher than the time needed to decelerate the axis with the velocity command value reset, taking maximum possible velocity into account.

Disable Torque

Best possible standstill P-0-0119 = 1 or fatal error

In the event of an error, the drive goes torque free and is braked only by the frictional force, i.e., it "coasts". The actual time to standstill can be considerable.

Note: The error reaction **"Torque disable**“ is absolutely necessary with **fatal errors** (**F8xx**) because braking with a defective end stage or feedback is no longer possible!

DANGER

Drive continues to move unbraked with error!

Danger to life from parts in motion if safety doors are open at the machining cells!

⇒ Check drive for motion (e.g., using **S-0-0040**, **Velocity feedback value,** if possible) and await standstill!

Note: Activation of the motor holding brake depends on **P-0-0525**, bit 1.
See section: "Motor holding brake“.

The temporal behavior of the brake in conjunction with an error reaction depends on the brake.

Spindle brake

The motor holding brake is not activated until the motor speed drops **below 10min^{-1}.**

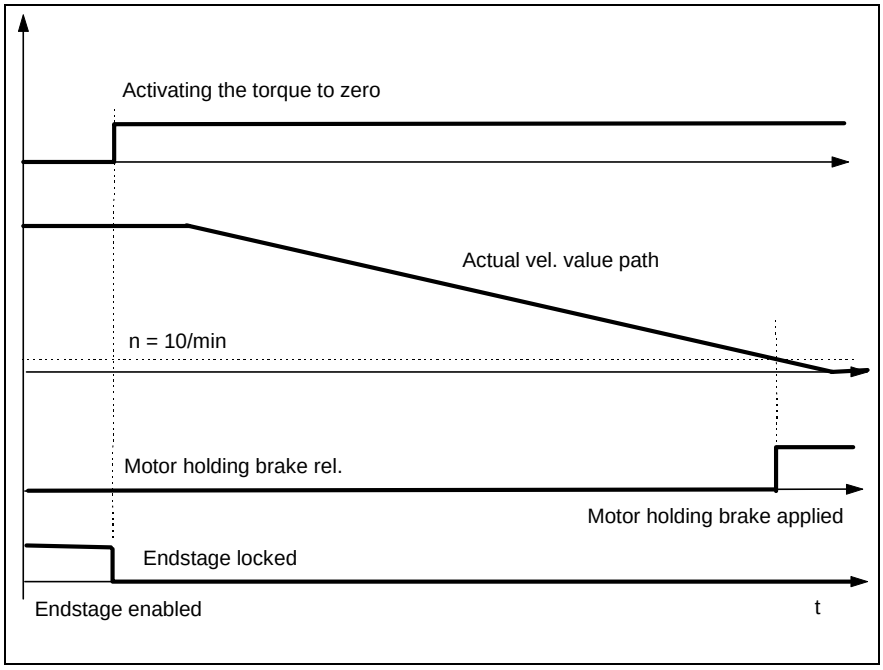


Fig. 8-44: Time diagram with torque to zero and **P-0-0525, Type of motor brake, Bit 1 = 1**

Servo brake

The motor holding brake is immediately activated!

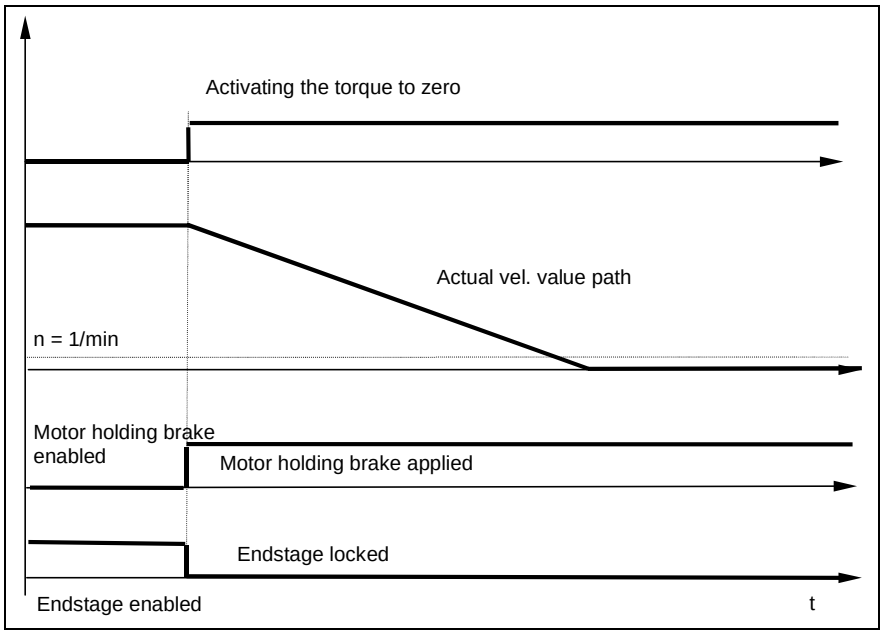


Fig. 8-45: Time diagram with torque to zero and **P-0-0525, Type of motor brake, Bit 1 = 0**

See section: "Motor holding brake".

Velocity command value to zero with filter and ramp

If "2" is entered in parameter **P-0-0119, Best possible deceleration**, then in the event of an error, the drive is brought to a standstill with velocity control with a command value ramp with end value zero. The speed command value is lead over a jerk-limited command value smoothing filter. The parameters used in this case are:

- **P-X-1201, Ramp 1 pitch**
- **P-X-1202, Final speed of ramp 1**
- **P-X-1203, Ramp 2 pitch**
- **P-X-1222, Velocity command filter**

To control the motor holding brake, the following parameters are also used:

- **P-0-0525, Type of motor brake**
- **P-0-0526, Brake control delay** and
- **P-0-0126, Maximum braking timeMaximale Bremszeit**

Activating the motor holding brake depends on P-0-0525, bit 1

Activating the motor holding brake in this case depends on the motor holding brake type set in parameter **P-0-0525, Type of motor brake.** If a "1" has been entered there in bit 1 for **spindle brake** then the motor holding brake is generally activated once the actual speed is less than 10 rpm (for rotary motors) or 10mm/min (linear motor).

Spindle brake

The endstage is deactivated in a delayed fashion by **P-0-0526, Brake control delay**. The time in P-0-0526 is the time the brake needs to safely clamp. Parameter **P-0-0526, Brake control delay** is automatically set in MKD and MHD motors to 150msec.

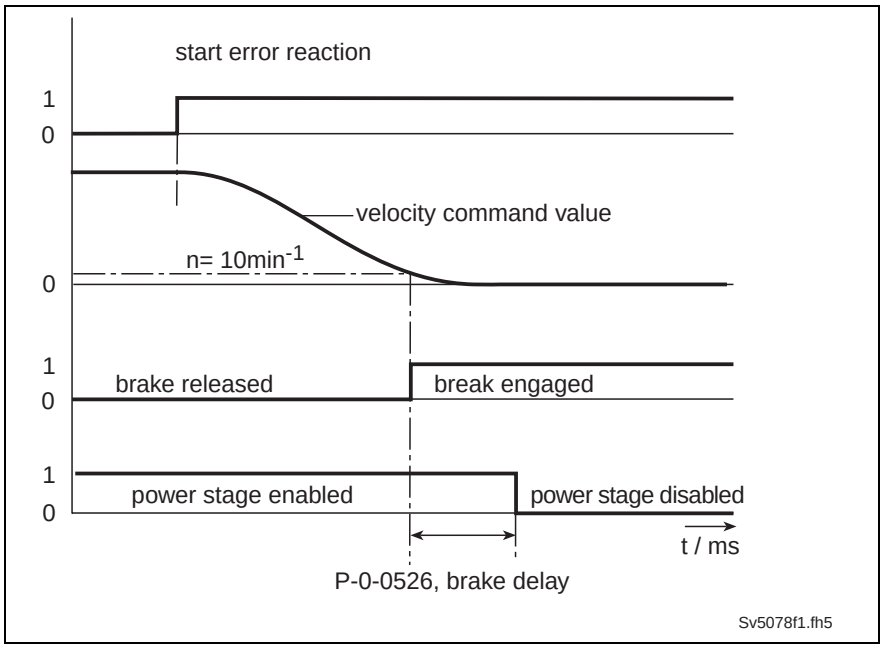


Fig. 8-46: Time diagram with command value to zero with filter and ramp and P-0-0525, Holding brake type, bit 1 = 1 (spindle brake)

If "0" is entered in bit 1 of parameter **P-0-0525, Type of motor brake** for *Servo brake* then the motor holding brake is activated after the time set in **P-0-0126, Maximum braking time** since the beginning of velocity command value to zero has run out.

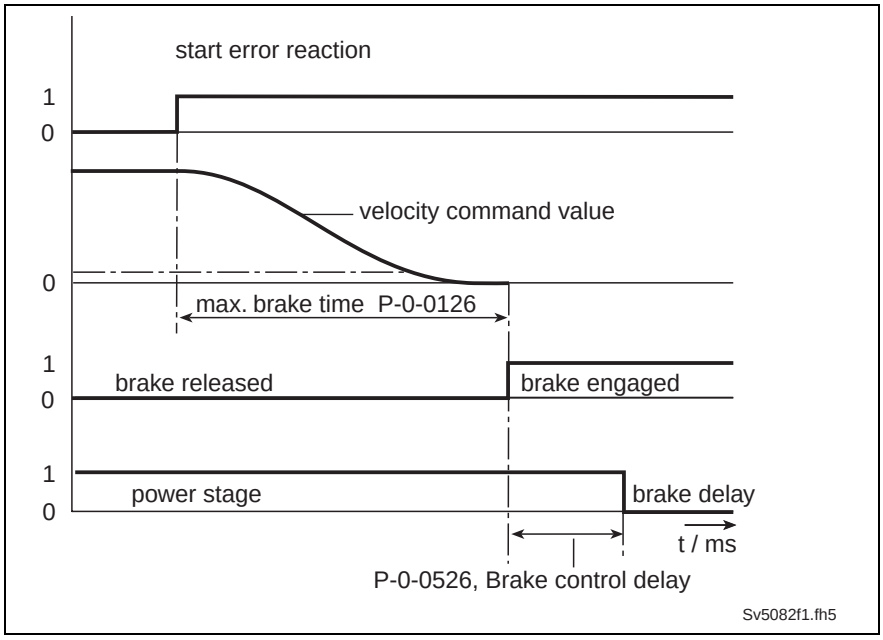


Fig. 8-47: Time diagram with command value to zero with filter and ramp and P-0-0525, Holding brake type, bit 1 = 0 (servo brake) and actual brake time < P-0-0126

Parameter **P-0-0126, Maximum braking time** helps to monitor decel time and ensures that the motor holding brake is activated if the theoretical decel time is exceeded as a result of an error.

Note: The value in P-0-0126, **Maximum decel time** must be set so that the drive can be brought safely to a standstill out of maximum velocity with greatest possible moment of inertia and load.

ATTENTION: If the value in **P-0-0126, Maximum braking time** is set too small, then the error reaction is terminated and the motor brake activated at a speed greater than 10 rpm. This will eventually damage the brake!

The actual brake time can exceed the set **P-0-0126, Maximum braking time** if:

- the command value ramp was modified without adjusting to P-0-0126 or
- the drive can no longer follow the set velocigy command value profile because of an error.

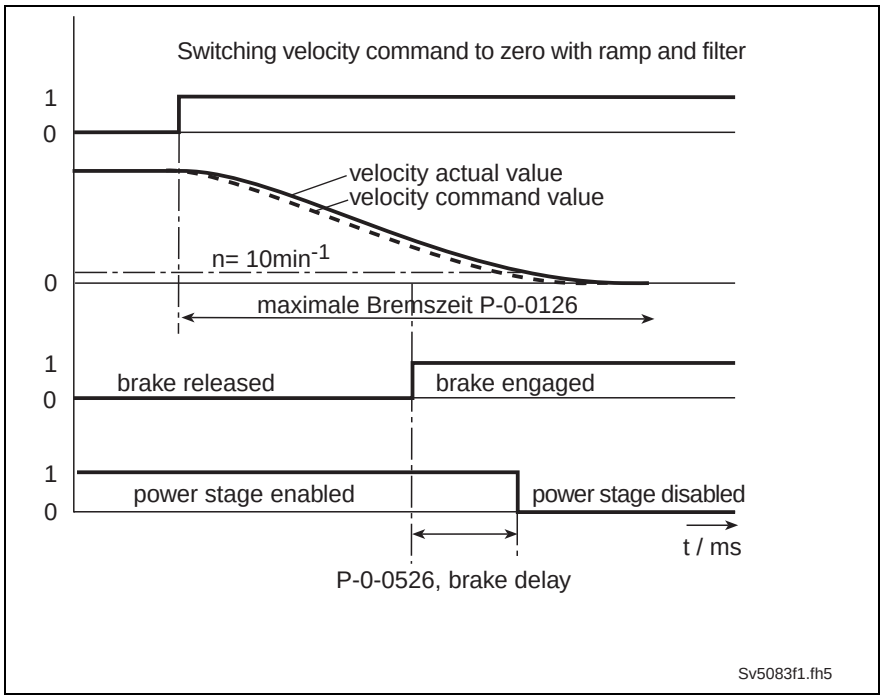


Fig. 8-48: Time diagram with command value to zero with filter and ramp and P-0-0525, Holding brake type, bit 1 = 0 (servo brake); actual brake time > P-0-0126, as ramp is too flat

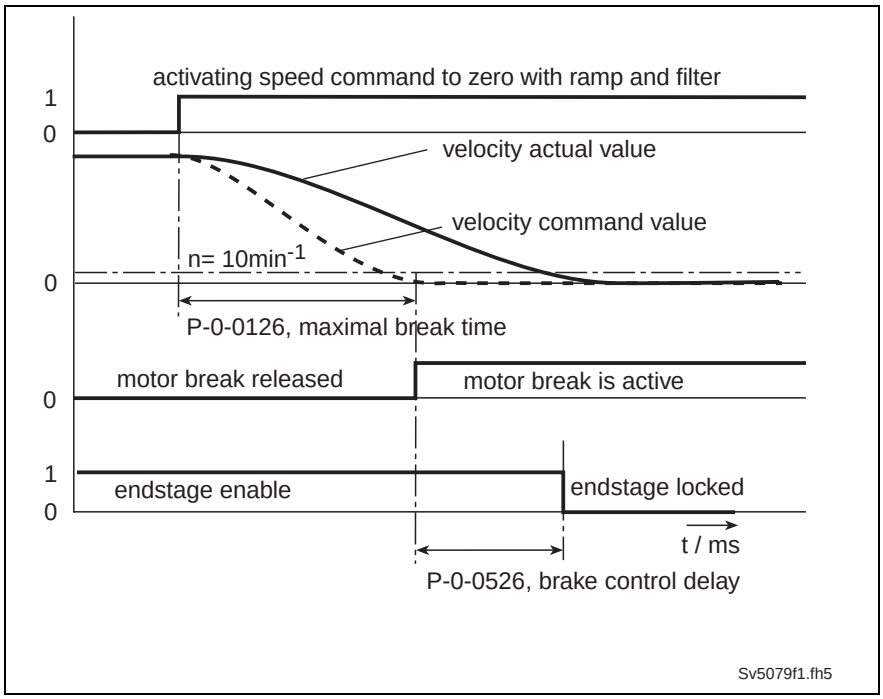


Fig. 8-49: : Time diagram with command value to zero with filter and ramp and P-0-0525, Holding brake type, bit 1 = 0 (servo brake); actual brake time > P-0-0126 as drive cannot follow ramp

Power off on error

In the case of modular units, via a signal line of the control voltage bus, the power supply unit can be informed as to whether the drive has detected an error that should lead to powering down. If the power supply unit receives such a message, then it shuts the DC bus voltage off. All other drives connected to the same power supply module also conduct the drive reaction as set in **P-0-0119, Best possible standstill**. This signalling of a drive error to the power supply unit can be set in the parameter **P-0-0118, Power off on error**.

Structure of the parameter:

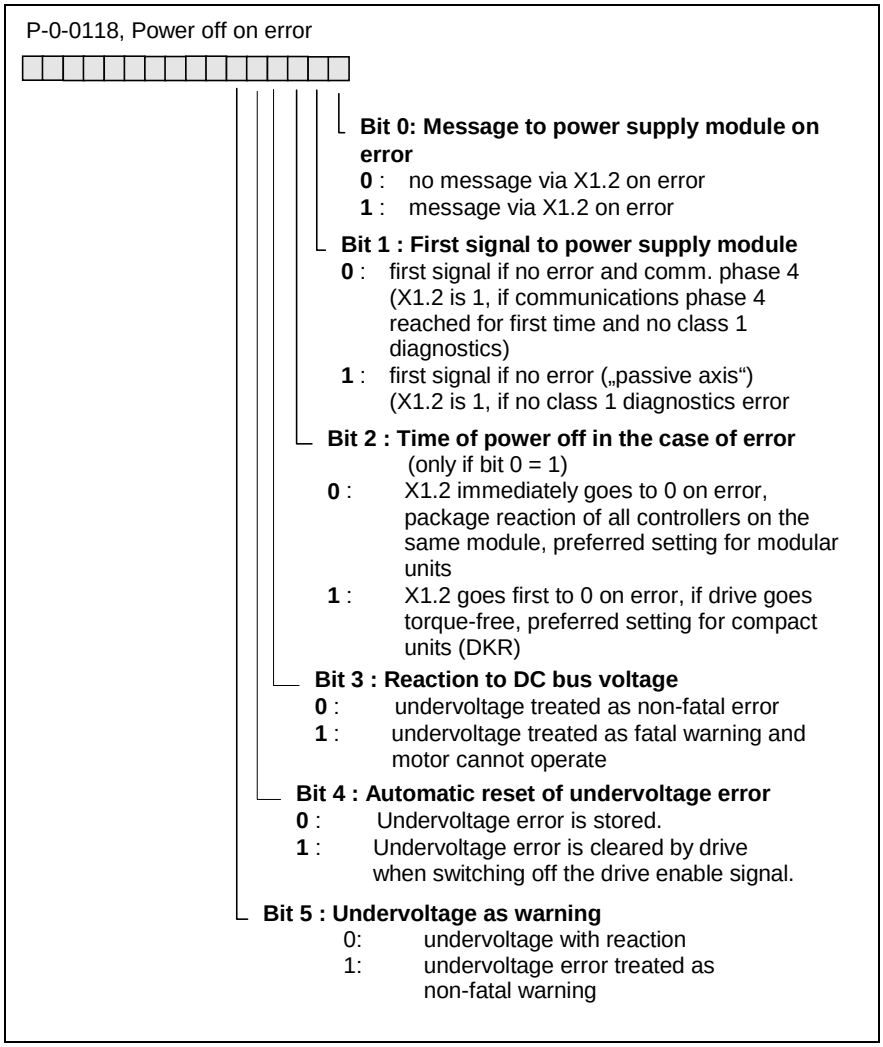

P-0-0118, Power off on error
Bit 0: Message to power supply module on error
0 : no message via X1.2 on error
1 : message via X1.2 on error
Bit 1 : First signal to power supply module
0 : first signal if no error and comm. phase 4 (X1.2 is 1, if communications phase 4 reached for first time and no class 1 diagnostics)
1 : first signal if no error („passive axis“) (X1.2 is 1, if no class 1 diagnostics error
Bit 2 : Time of power off in the case of error
(only if bit 0 = 1)
0 : X1.2 immediately goes to 0 on error, package reaction of all controllers on the same module, preferred setting for modular units
1 : X1.2 goes first to 0 on error, if drive goes torque-free, preferred setting for compact units (DKR)
Bit 3 : Reaction to DC bus voltage
0 : undervoltage treated as non-fatal error
1 : undervoltage treated as fatal warning and motor cannot operate
Bit 4 : Automatic reset of undervoltage error
0 : Undervoltage error is stored.
1 : Undervoltage error is cleared by drive when switching off the drive enable signal.
Bit 5 : Undervoltage as warning
0: undervoltage with reaction
1: undervoltage error treated as non-fatal warning

Fig. 8-50: P-0-0118, Power off on error

Units with extrinsic power supplies are signalled through connector X1, pin 2. If power off on error has been set, then bit 2 of compact units should be set to 1. The error message of the drive causes a mains separation meaning that the energy generated during braking cannot be fed back into the mains. Without a braking resistor (bleeder), the drives then coast to a standstill.

Using bit 1 of P-0-0118 it is possible to set when the error message from the drive to the power supply unit can be removed for the first time. If this bit is 1, then immediately after the basic initialization of the drive, the error reaction is removed and powering up thus becomes possible already in communications phase 0. If bit 1 = 0, then the drive must be in communications phase 4 and error free before the error message to the power supply unit can be removed for the first time.

Reaction to Undervoltage

Bits 3 , 4 and 5 of parameter P-0-0118 offer the options on how to handle the undervoltage. Undervoltage happens when the drive is enabled (with torque) and signal for the DC bus voltage goes down.

With **bit 3 = 1**, undervoltage can be treated as a "fatal warning". This makes sense if the energy in the DC bus must be retained for that period of time which a control needs to start the synchronized deceleration of several drives. The drive, in this case, does not signal a class 1 diagnostics error, and the reaction parametrized in **P-0-0119, best possible standstill** is not executed. Shutting the motor off brings about a slower drop in the DC bus voltage. This means that asynchronous motors can still retain a magnetic field once the control begins to bring the drives to a synchronized standstill. Braking takes place in generator mode.

If the undervoltage is treated as an error (bit 3, 5 = 0), then bit 4 can be used to set whether the error automatically clears itself once the control switches off the drive enable. This makes sense if the error also occurs during the course of a normal shutdown caused by the fact that the control does not clear the enable quickly enough.

With **bit 5 = 1**, you can suppress any reaction to the state of undervoltage. In this case, **only** a **warning** is generated.

NC Response in Error Situation

NC response during an error situation is only possible during non-fatal errors. Otherwise the drive reacts immediately with an error response.

If the drive control device recognizes an error, it sends a message to the control (CNC) . The control can then decelerate the servo axis of the machine without possible damage.

If this is desired, you have to delay the drive error reaction to allow the axis to continue movement to the values set by the control. This is achived by setting the time delay between the recognition of the error and the drive's error reaction. This can be set in parameter **P-0-0117, NC Reaction on Error**.

The following applies:

Value of P-0-0117	Function
0	Drive proceeds the error reaction immediately after recognition of the error.
1	Drive continues for 30 sec in the selected operating mode, then follows the "best possible deceleration".

Fig. 8-51: NC Reaction on Error

Note: Activating the "NC Reaction on Error" is only recommended for controls that have a corresponding error reaction procedure.

Emergency stop feature

The E-Stop function supports the braking of the drive via a hardware input on the drive controller. It thus represents the option of shutting down the drive parallel to command communication, in an emergency.

Activation and the how to set the deceleration:

The following parameters are used:

- **P-0-0008, Activation E-Stop function**
- **P-0-0223, Status Input E-Stop function**

Functional principle of the E-Stop function

By activating the E-Stop function (bit 0 = 1) the drive executes, upon actuation of the E-stop input, the selected reaction for deceleration. This reaction depends on bit 2 of P-0-0008.

After activation of the E-Stop Input (bit 0 = 1), the drive is prompted to perform the selected procedure to shutdown the drive. This reaction at first depends on bit 2 of P-0-0008.

Interpretation as warning E834 Emergency-Stop active

If the interpretation "fatal warning" has been parametrized there (bit 2 = 1), then the drive responds as with switching off the external drive enable with the reaction parametrized in **P-0-0119, Best possible deceleration**. The warning diagnosis **E834 Emergency-Stop** appears. Bit 15 is set in **S-0-0012, Class 2 diagnostics** (manufacturer specific warning). Simultaneously, the bit "change bit class 2 diagnostics“ is set in the drive status word. This change bit is cleared by reading **S-0-0012, Class 2 diagnostics.**

The functional principle at work when actuating the E-Stop input is that of a series connection to an external drive enable. When activating the E-Stop input, the drive responds as if the external drive enable switched off.

To re-activate the drive, the E-Stop input must become inactive, and another 0-1 edge must be applied to the external drive enable.

Interpretation als error with adjustable reaction

If bit 2 has been set to treat it as an error, then the reaction selected in bit 1 is performed. The error diagnosis **F434 Emergency-Stop** (or **F634 Emergency-Stop**), E-stop activated appears, and bit 15 is set in parameter **S-0-0011, Class 1 diagnostics** . Bit 13 is set in the drive status word of the drive telegram, i.e., drive interlock, error with class 1 diagnostics is set. The error can be cleared via command **S-0-0099, C500 Reset class 1 diagnostic, or** key S1 on the drive controller if the E-stop input is no longer activated.

This function basically works as if an error had occurred in the drive. The drive reaction is immediate and without delay, independent of parameter **P-0-0117, NC reaction on error.**

F434 Emergency-Stop active

If bit 1 = 0, the drive shuts down according to **P-0-0119, Best possible deceleration**. The diagnosis upon activating the E-stop input then reads **F434 Emergency-Stop.**

Status of the Emergency-Stop Input

Interpretation as error with reaction as "Velocity command value to zero"

If bit 1 is set to 1 , then the drive is braked at maximum torque, if an E-Stop of the drive is triggered, until the speed = 0, regardless of the error reaction set in parameter P-0-0119. This corresponds to the best possible standstill "Velocity command value to zero". The diagnosis with the activation of the E-Stop input then reads **F434 Emergency-Stop.**

The state of the E-Stop input can be controlled via parameter **P-0-0223, Status Input E-Stop function**. The state of the E-stop input is stored there in bit 0.

Activation and Polarity of the E-Stop Input

For the activation of the E-Stop input and the selection of a response for shutdown of the drive, use parameter **P-0-0008, Activation E-Stop function**.

The following applies:

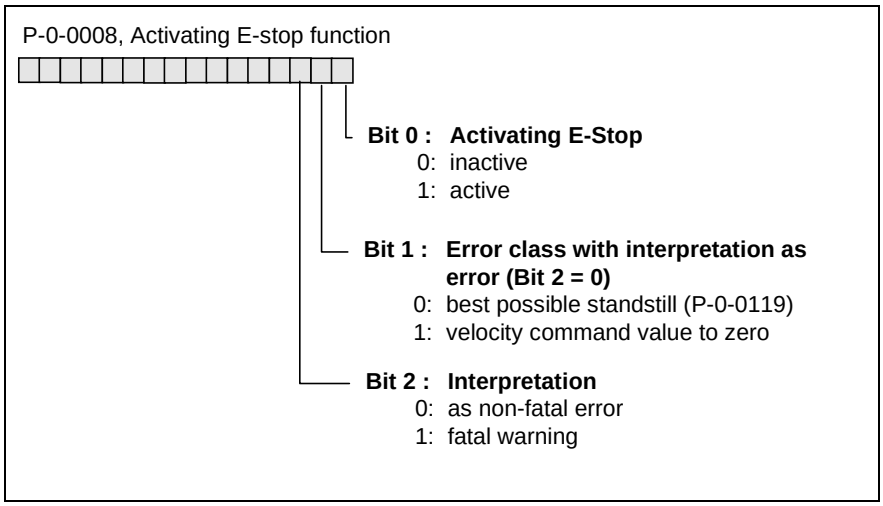

P-0-0008, Activating E-stop function
Bit 0 : Activating E-Stop
0: inactive
1: active
Bit 1 : Error class with interpretation as error (Bit 2 = 0)
0: best possible standstill (P-0-0119)
1: velocity command value to zero
Bit 2 : Interpretation
0: as non-fatal error
1: fatal warning

Fig. 8-52: P-0-0008, Activation of E-Stop-Function

Connection of the Emergency-Stop Input

The drive controllers are provided with a binary input for the emergency-stop signal. You can fint it on the plug-in module DAE 02.x. The input is galvanically seperated and has to be supplied through the same connector with +24V.

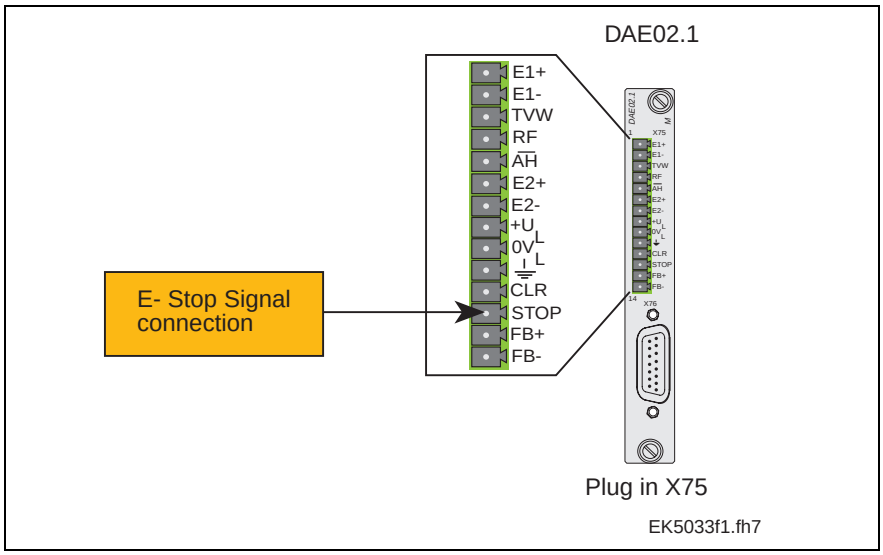


Abb. 8-53: Connection of E-Stop

If the emergency stop input was activated but the 24 V supply failed, then the error **F255 External power supply DAE 02 error** is generated.

8.6 Control Loop Settings

General Information for Control Loop Settings

The control loop settings in a digital drive controller are important for the characteristics of the servo axis. Determining the control loop settings requires expert knowledge.

"Optimizing" the regulator settings is generally not necessary!

For this reason, application-specific control parameters are available for all digital INDRAMAT drives. These parameters are either contained in the feedback data memory and can be activated through the command **C700 Command basic load** (with MHD, MKD and MKE motors) or they must be input via the setup/service program. (See also Load Default Feature)

In some exceptions, however, it may be necessary to adjust the control loop settings for a specific application. The following section gives a few simple but important basic rules for setting the control loop parameters in such cases.

In every case, the given methods should only be seen as guidelines that lead to a robust control setting. Specific aspects of some applications may require settings that deviate from these guidelines.

The control loop structure is made up of a cascaded (nested) **position, velocity and torque/force loop**. Depending on the operating mode, only the torque control loop or the torque and velocity control loops can become operative. The control is structured as depicted below:

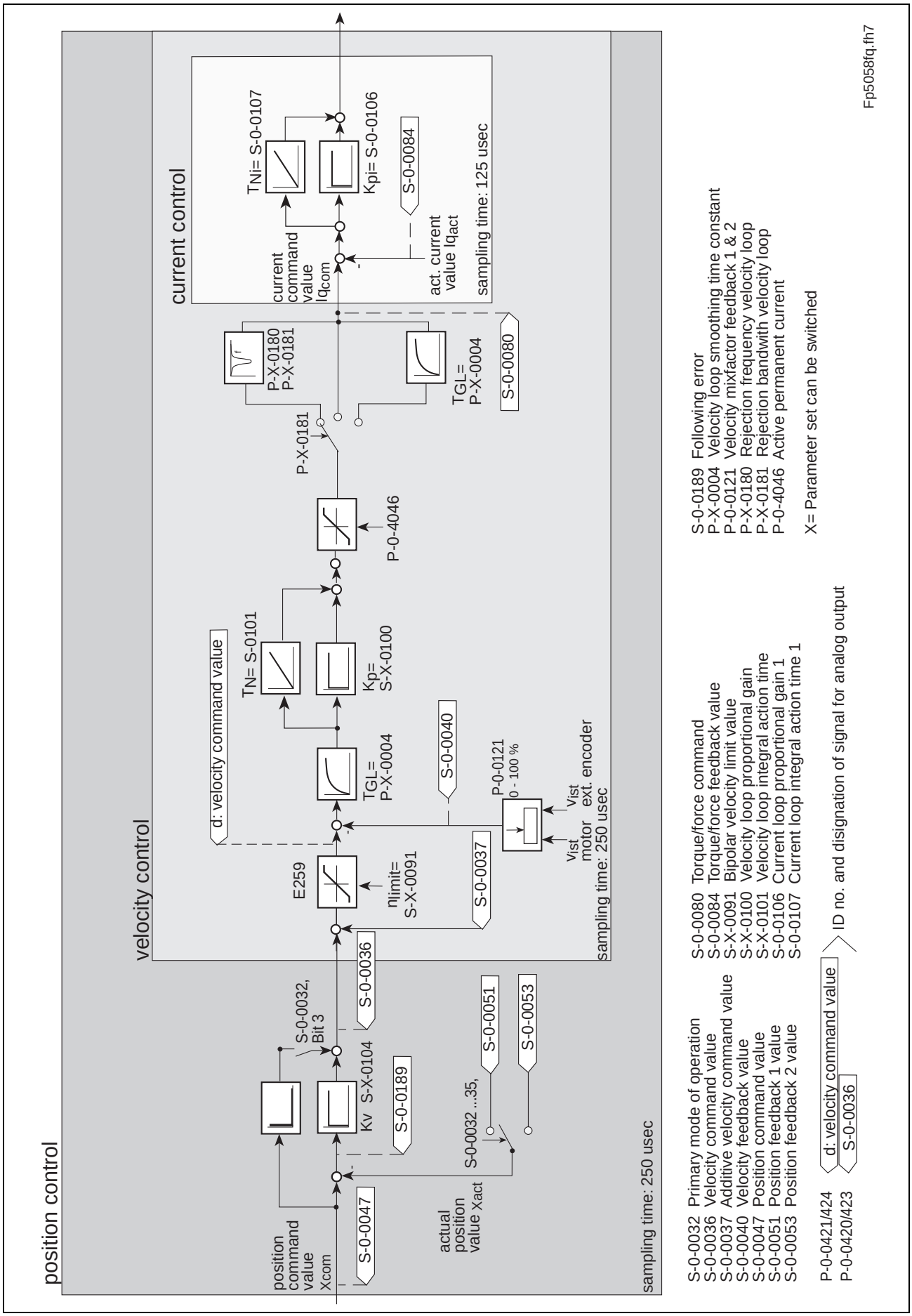


Fig. 8-54: Control structure

Load Default

With the command **Basic Load**, you can activate the default control parameters for motor types with **motor feedback data memory** such as

- MHD
- MKD
- MKE

With these parameters, the relevant control parameters for the appropriate motor type used can be set. The parameters are pre-defined by the manufacturer for the moment of inertia relationship of $J_{own} = J_{load}$.

Most applications can work with these values.

Default values can be set for the following parameters:

- **S-0-0106, Current loop proportional gain 1**
- **S-0-0107, Current loop integral action time 1**
- **S-X-0100, Velocity loop proportional gain**
- **S-X-0101, Velocity loop integral action time**
- **P-X-0004, Smoothing Time Constant**
- **S-X-0104, Position loop Kv-factor**
- **P-X-0181, Rejection bandwidth velocity loop**

The feature **Load Default Settings** can be activated in two different ways:

- Automatic activation during the command procedure **S-0-0128, C200 Communication phase 4 transition check** for the first operation of this motor type with this drive.
- With the command procedure **S-0-0262, C700 Basic Load**

Automatic Execution of the Load Default Feature

If a controller has been operated with a specific type of motor, then the controller will detect this from that point forward. During the execution of command **S-0-0128, C200 Communication phase 4 transition check** it compares parameter **S-7-141, Motor type**, which is read out of the data memory, with the value for parameter **S-0-0141, Motor type** which is backed up in the parameter memory of the controller. If these two parameters are different, then error **F208 UL The motor type has changed** is generated. "UL" appears in the 7-segment display.

Before the user can reset the error and thus start the base load function, the option of secure a specific set of controller parameters is available.

Error **F208 UL The motor type has changed** can be reset in two different ways:

1.) executing the command
S-0-0099, C500 Reset class 1 diagnostic

2.) Actuating key S1

In both cases, the load base values function is activated.

If the execution of load base values is not posible, then the relevant command error of command **S-0-0262, C700 Command basic load** will appear**.**

(Also see section: "Error causes when executing load base value function").

Run the Load Default Settings feature as a command

With parameter **S-0-0262, C700 Basic load**, the feature can be run as a command. This might be useful if manually changed control parameters are to be set back to the default values.

Error Conditions of the Load Default Settings Procedure

If the feature started by running the command **S-0-0262, C700 Basic load** is not successfully processed, then the reason for this error is displayed either on the 7-segment display or with the diagnostic parameter **S-0-0095**.

The following could cause an error during basic load:

SS Display	Diagnostic Message:	Cause:
C702	Default parameters not available	Basic load (or load defaults) is impossible for the motor type selected, only for MHD-, MKD and MKE
C703	Default parameters invalid	Connection of drive to motor encoder data memory is interrupted or feedback is defective
C704	Parameters not copyable	The existing default value cannot be processed since, for example, the extreme value limit was exceeded in the default value
C705	Locked with password	A customer password has been set which locks out changes to parameters

Fig. 8-55: Possible errors during Basic Load command

If a parameter can not be set on its default value, the parameter is set invalid in its data status. This serves safety purposes and helps in diagnosing errors.

Setting the Current Controller

The parameters for the current loop are set by INDRAMAT and cannot be adjusted for specific applications. The parameter values set at the factory are activated with the command **S-0-0262, C700 Command basic load** for MKD/MHD motors or must be retrieved from the motor data sheet.

The parameters for the current controller are set via the parameters

- **S-0-0106, Current loop proportional gain**
- **S-0-0107, Current Loop Integral Action Time**

Warning

Changing the values defined by INDRAMAT
can result in damages to the motor and the drive controller.
⇒ Changes to the current controller parameters are not permitted.

Setting the Velocity Controller

Pre-requisites:

The current control must be correctly set.

The velocity controller is set via the parameters

- **S-X-0100, Velocity Loop Proportional Gain**
- **S-X-0101, Velocity Loop Integral Action Time**
- **P-X-0004, Smoothing Time Constant**

as well as the parameters

- **P-X-0180, Rejection frequency velocity loop**
- **P-X-0181, Rejection bandwidth velocity loop**

These can be set either by running once the load default feature or by following the procedure hereafter.

Preparations for Setting the Velocity Controller

A number of preparations must be made in order to be able to set the velocity loop (controller):

- The mechanical system must be set up in its final form in order to have original conditions while setting the parameters.
- The drive controller must be properly connected as described in the user manual.
- The safety limit switches must be checked for correct operation (if available)
- The velocity control operating mode must be selected in the drive.
-

The controller setting must be selected for the start of parameterization as follows:

S-X-0100, Velocity Loop Proportional Gain = default value of the connected motor.

S-X-0101, Velocity Loop Integral Action Time = 6500 ms

P-X-0004, Smoothing Time Constant = Minimum value (= 250µs)

P-X-0181, Rejection bandwidth velocity loop = 0 Hz

Note: When determining the velocity control parameters, no compensation function should be active.

Definition of the Critical Proportional Gain and P-X-0004, Smoothing Time Constant

- After turning on the controller enable, let the drive move at a low velocity. Rotational motors: 10...20RPM, linear-Motors: 1...2 m/min)
- **Raise the S-X-0100, Velocity loop-proportional gain** until unstable behavior (continuous oscillation) begins.
- Determined the frequency of the oscillation by oscilloscoping the actual velocity (see also "Analog Output"). If the frequency of the oscillation is much higher than 500Hz, raise the **P-X-0004, Smoothing Time Constant** until the oscillation ends. After this, increase the **S-X-0100, Velocity Control Proportional Gain** until it becomes unstable again.

- **Reduce the S-X-0100, Velocity loop proportional gain** until the oscillation ends by itself.

The value found using this process is called the "critical velocity loop proportional gain".

Determining the Critical Integral Action Time

- **Set S-X-0100, Velocity Loop Proportional Gain** = 0.5 x critical proportional gain
- **Lower S-X-0101, Velocity controller integral action time** until unstable behavior results.
- **Raise S-X-0101, Velocity controller integral action time** until continuous oscillation vanishes.

The value found using this process is called the "Critical Integral Action Time."

Determining the Velocity Controller Setting

The critical values determined before can be used to derive a control setting with the following features:

- Independent from changes to the axis since there is a large enough safety margin to the stability boundaries.
- Safe reproduction of the characteristics in series production machines.

The following table shows many of the most frequently used application types and the corresponding control loop settings.

Application Type:	Velocity controller proportional gain	Velocity loop Integral Action Time:	Comments:
Feed axis on standard tool machine	Kp = 0.5 • Kpcrit	Tn = 2 • Tncrit	Good stiffness and good command response
Feed axis on perforating press or chip-cutter machines	Kp = 0.8 • Kpcrit	Tn = 0	High proportional gain; no I-part, to achieve shorter transient periods.
Feed drive for flying cutting devices	Kp = 0.5 • Kpcrit	Tn = 0	Relatively undynamic control setting without I-part, to avoid structural tension between the part to cut off and the machine.

Fig. 8-56: Identification of Velocity Controller Settings

See also Supplement B, Diagnostic Explanations: **F878 Velocity loop error**.

Filtering oscillations from mechanical resonance

The drives are able to suppress oscillations caused by the drive train (gear) between the motor and the axis or by the spindle mechanics even in a narrow band. Thus, an increased drive dynamics with good stability can be achieved.

The mechanical system of rotor-drive train-load is induced to generate mechanical oscillations as a result of position/velocity feedback in a closed control loop. This behavior identified as a "two mass oscillator" is generally within the 400 to 800 Hz range, depending on the rigidity (or elasticity) and spatial volume of the mechanical system.

This "two mass oscillation" usually has a clear resonance frequency which can be specifically suppressed by a notch filter (band suppressor) provided in the drive.

By suppressing the rejection frequency the dynamics of the velocity and position control loops in terms of control can be significantly improved compared to without a band suppression filter.

This results in greater contour accuracy and smaller cycle times for positioning processes, leaving sufficient stability margin.

The rejection frequency and bandwidth can be set. The rejection frequency is the one with highest attentuation, the bandwidth determines the frequency range, at whose borders the attenuation is 3dB less. Greater bandwidth leads to smaller band attenuation of the center frequency!

The following parameters can be used to set both:

- **P-X-0180, Rejection frequency velocity loop**
- **P-X-0181, Rejection bandwidth velocity loop**

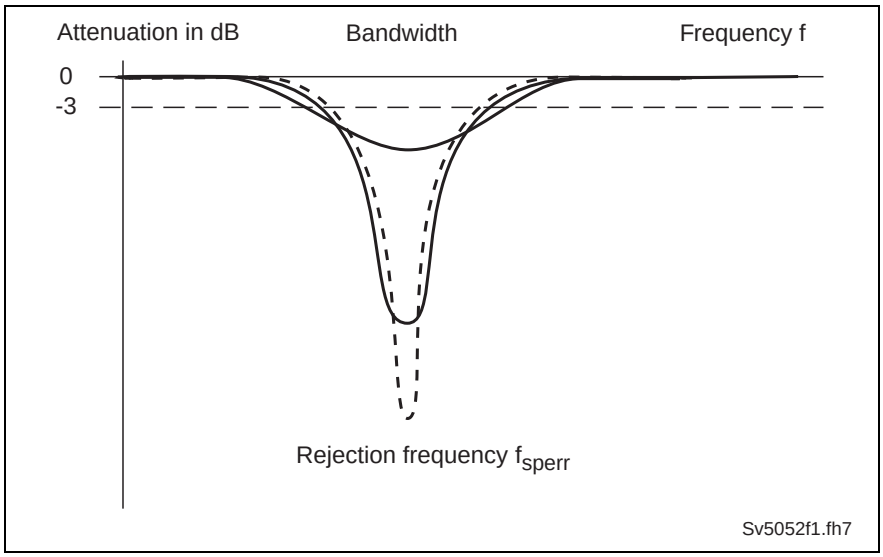


Fig. 8.57: Amplitude response of the rejection filter in terms of bandwidth - qualitative

To set the band filter, we recommend the procedure described as follows:

Pre-settings

⇒ Set rejection filter inactive. Set 0 in parameter **P-X-0181 Rejection bandwidth velocity loop.**

Determing resonance frequency

⇒ Connect oscilloscope to analog output channels. Assign velocity feedback value to analog output 1 (in **P-0-0420, Analog output 1, signal selection** "S-0-0040" and in **P-0-0422, Analog output 1 scaling** enter the scaling, e.g., 100 Rpm / 10 Volts.

- or -

⇒ Use the oscilloscope function of the drive to display velocity feedback value.

⇒ Excite the drive mechanics, e.g., tap lightly with a rubber hammer.

⇒ Record the time of the velocity oscillations with an oscilloscope or oscilloscope function and analyze the clearly salient frequencies. If the oscilloscope function is used, then the resonance frequency can be directly read out of the frequency readout.

Determining the initial state of the loop

⇒ Set the drive enable signal and optimize the velocity loop with inactive rejection filter (see "Setting the Velocity Controller").

⇒ Record step response of the velocity feedback and the torque/force generating command current with a small velocity command step. (The torque-generating command current may not enter the limit during this process.)

Turn rejection filter on and check the effect

⇒ Enter the most salient frequency in Hz in parameter **P-X-0180, Rejection frequency velocity loop.**

⇒ Enter a minimum bandwidth in parameter **P-X-0181, Rejection bandwidth velocity loop,** e.g., 25 Hz.

⇒ Record the previous step response again.

If the step response features less overshoot and shorter periods of oscillation, then:

⇒ Check whether increasing the value of **P-X-0181, Rejection bandwidth velocity loop** causes an improvement

- or -

⇒ check whether a change in the value of **P-X-0180, Rejection frequency velocity loop** means an improvement.

If the step response results in the same behavior, then:

⇒ Check the resonance frequency analysis

- or -

⇒ clearly increase the value in **P-0-0181, Rejection bandwidth velocity loop.**

Optimize rejection filter or velocity loop

⇒ with the pre-optimized values of **P-X-0180, Rejection frequency velocity loop** and **P-X-0181, Rejection bandwidth velocity loop,** optimize the velocity controller again (see above).

The step responses defined above must have a similar appearance with higher values for **S-X-0100 Velocity loop proportional gain** and / or smaller values for **S-X-0101 Velocity loop integral action time.**

An additional optimizing run may be necessary for **P-X-0180 Rejection frequency velocity loop** and **P-X-0181, Rejection bandwidth velocity loop** using the step response (see above).

Optimizing the Notch Filter or the Velocity Controller

⇒ With the pre-optimized values of **P-X-0180, Rejection frequency velocity loop** and **P-X-0181, Rejection bandwidth velocity loop**, optimize again the velocity controller (as above).

The transient response defined above must have a similar aspect at higher values for **S-X-0100 Velocity loop proportional gain** and/or smaller values for **S-X-0101 Velocity loop integral action time**.

⇒ If necessary, run another optimization for **P-X-0180 Rejection frequency velocity loop** and **P-X-0181, Rejection bandwidth velocity loop** according to the transient response.

Filtering with double smoothing filter

⇒ Optimization of the control loop with a notch filter (band suppression) does not always make the regulation good enough. This happens for example when the closed loop does not have significant resonance frequencies. Activation of a second smoothing filter (with low pass response) can, depending from the case, improve the regulation quality as desired.

⇒ To do this, set the parameter **P-X-0181, Rejection bandwidth velocity loop** to **-1**. The notch filter as well as the assigned parameter **P-X-0180, Rejection frequency velocity loop** are deactivated. Instead of the notch filter, a smoothing filter is activated in the control loop. This uses the same smoothing time constant T_{gl} as the smoothing filter with **P-X-0004, Velocity loop smoothing time constant**. Together with the smoothing filter at the input of the velocity controller, you obtain a low pass filter of 2nd order (2 poles). Frequencies greater than the cutoff frequency $f_g = 1/2\pi T_{gl}$ are much more suppressed and cannot excite oscillations in the control loop any more. The parameter for the filter is **P-X-0004, Velocity loop smoothing time constant**.

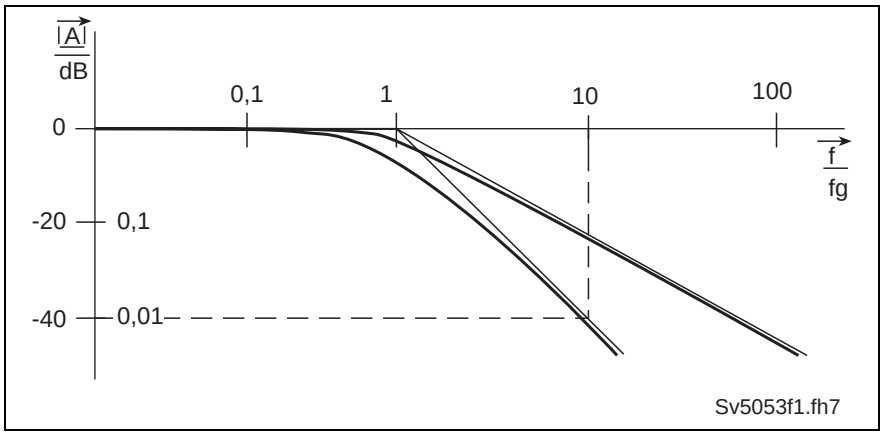


Fig. 8-58: Frequency response of low pass filters with 1 pole and with 2 poles

Note: The adjustment is the same as described under "**Determining the critical proportional Gain and P-X-0004, Velocity loop smoothing time constant**".

Velocity Control Loop Monitoring

If the velocity control loop monitor detects a fault in the velocity control loop then error

- **F878 Error in velocity control loop**

is generated.

Note: The velocity control loop monitor is only active if an operating mode is active with which the velocity control loop in the drive is closed and monitoring activated (always except with torque control).

Activating the monitor

The monitor is activated with parameter **P-0-0538, Motor function parameter 1**.

The structure of the parameter:

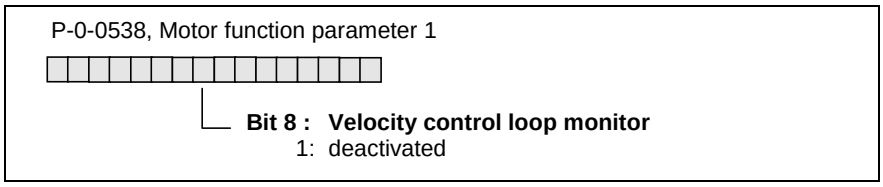


Fig. 8-59: P-0-0538, Motor function parameter 1

See also the parameter description: **P-0-0538, Motor function parameter 1**.

Note: It is highly recommended not to deactivate the velocity control loop monitor activated at the factory as it represents a basic safety function of the drive!

The causes of a monitor trigger

The velocity control loop monitor is designed to monitor for those faults that could lead the motor torque in the wrong direction.

The following options are basically possible:

- incorrect poles with motor connection
- wrong commutation angle
- faults in the velocity encoder

Note: This prevents the "runaway effect" of the motor.

Criteria for Triggering the Monitor

The following four criteria must be met for the velocity control loop monitor to be triggered :

- Current command value in the limit
- motor accelerating in the wrong direction
- control deviation > $0.1*n_{Max}$
- and actual velocity control value is > $0.0125*n_{Max}$

Setting the position controller

Pre-requisite: Current and speed control must be correctly set.

The position controller can be set with the parameter

- **S-X-0104, Position Controller Kv Factor**

This can be set by either executing the load default settings procedure or by following the process below.

Preparations for Setting the Position Control Loop

A number of preparations must be made in order to be able to set the position controller properly:

- The mechanical system must completely assembled and ready for operation.
- The drive controller must be properly connected as described in the user manual.
- The safety limit switches must be checked for correct operation (if available)
- Operate the drive in a mode that closes the position loop in the drive (drive controlled interpolation).
- The velocity controller must be properly tuned. The start value chosen for the K_v-factor should be relatively small ($K_v = 1$).
- For the determination of the position controller parameter, no compensation function should be activated.

Determing the Critical Position Controller Gain

- Move axis at a slow velocity, i.e., with a jog function at a connected NC Control (Rotating Motors: 10...20 Rpm).
- Raise the K_V-factor until instability appears.
- Reduce the K_V-factor until the continuous oscillation ends by itself.

The Kv factor determined through this process is the "**Critical position control loop gain".**

Determining the Position Controller Setting

In most applications, an appropriate position controller setting will lie between 50% and 80% of the critical position controller loop gain.

This means:

S-x-0104, Position Loop KV-Factor = 0.5..0.8 • Kvcrit

For various parameter blocks **x.**

Position Control Loop Monitoring

The position control loop monitor helps to diagnose errors in the position control loop.

Reasons for errors in the position control loop can be:

- Exceeding the torque or acceleration capability of the drive.
- Blocking of the axis' mechanical system
- Disruptions in the position encoder

The monitoring of the position circuit is only active when an operation mode with closed position loop is active in the drive.

To set and check the monitoring function, two parameters are used:

- **S-0-0159, Monitoring Window**
- **P-0-0098, Max. Model Deviation**

If the drive detects an error in the position control loop, the error message

- **F228 Excessive deviation**

is issued.

General Operating Characteristics of Position Control Loop Monitoring

To monitor the position control loop, a model actual position value is computed, which depends only on the commanded position profile and the set position loop parameters. This model position is compared continuously to the actual position. If the deviation exceeds **S-0-0159, Monitoring Window** for more than **4msec**, an error **F228 Excessive deviation** will be generated.

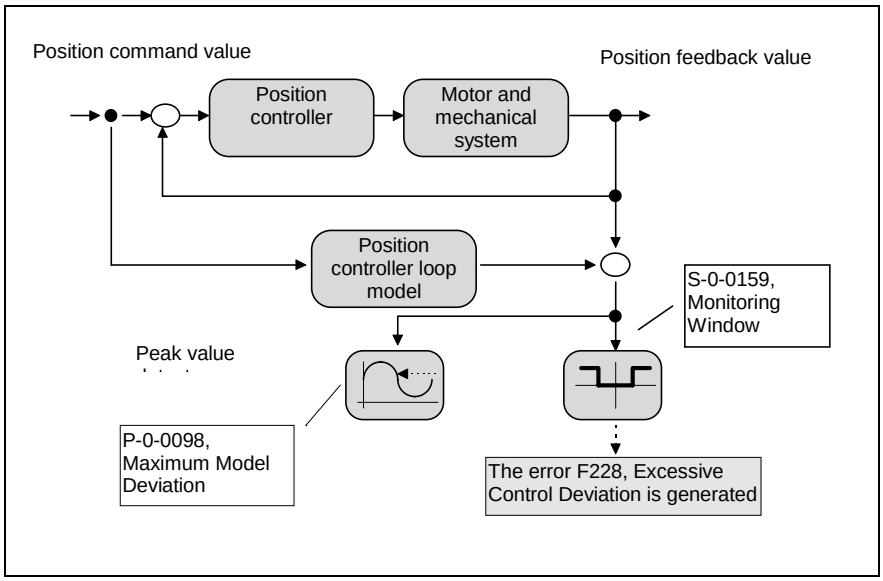


Fig. 8-60: Schematic of Position Control Loop Monitoring

Note: For accurate monitoring, always the actual feedback value from the position control is used. This means that for position control with the motor encoder, position feedback value-1 is used; and for position control with the external encoder, the position feedback value-2 is used.

Setting the Position Control Loop Monitor

Requirements Requirements for the setup of the position loop monitoring are

- Check the velocity and position control loops for their appropriate settings.
- The axis in question should be checked mechanically and should be in its final state.

settings The position control loop monitor settings are performed:

- Through the connected control, you should proceed in a typical operation cycle. In this mode, move at the maximum projected velocity.
- In parameter **P-0-0098, Max. Model Deviation**, the maximum deviation between the actual feedback value and the expected feedback value is always displayed. (Note: The contents of this parameter are not saved. After enabling the drive, this parameter equals zero.)
- This value can be used to help set the monitoring window. Parameter **S-0-0159, Monitoring Window** should be set to **P-0-0098, Max. Model Deviation** multiplied by a safety factor. A safety factor between 1.5 and 2.0 is recommended.

Example:

Content of P-0-0098, Maximum Model Deviation:

0.1 °

⇒ Determination for the parameter S-0-159, Monitoring Window:

0.2 ° (= 2 x 0.1 °)

Deactivation of the Position Control Loop Monitoring

It is strongly recommended to activate the position loop monitoring. However, there are exceptions for which the position loop monitoring must be deactivated. You can do that with the parameter **S-0-0159, Monitoring Window**, if it is set to very high values.

Note: By default, the Position Control Loop Monitoring is active.

Setting the Velocity Mix Factor

With the help of the velocity mix factor, you can combine the velocity feedback value, used for velocity control, from the motor and the external measurement system. This might be an advantage, when there is play or torsion between motor and load.

To set the mixing ratio, use the parameter

- **P-0-0121, Velocity Mixfactor Feedback1 & 2**

Precondition: The function is only applicable when ther is an external measurement system. If this is not available, **P-0-0121** is automatically set to 0 % .

The mixture of the velocity feedback value can be continuously varied between:

- 100% Velocity feedback value of the motor encoder
  /
  0% actual value of the external encoder (P-0-0121 = 0)
  and
- 0% Velocity feedback value of the motor encoder
  /
  100% actual value of the external encoder (P-0-0121 = 100 %)

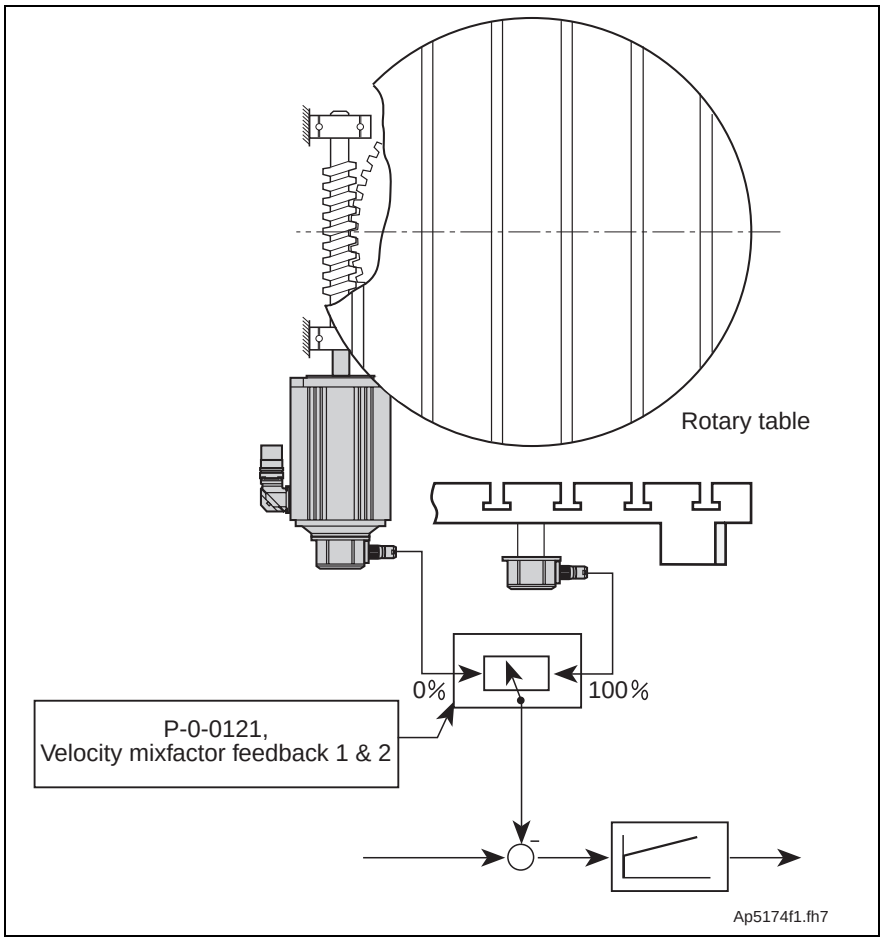


Fig. 8-61: Velocity Mixture Diagram

8.7 Drive Halt

The drive halt function is used to bring an axis to a standstill with defined accel and defined jerk.

The function is activated:

- setting the drive halt input to zero

or

- by interrupting a drive control command (e.g., drive-guided referencing).

The following parameters are used for this purpose:

- **S-X-0138, Bipolar acceleration limit value**
- **S-0-0349, Jerk limit bipolar**
- **P-X-1201, Ramp 1 pitch**
- **P-X-1202, Final speed of ramp 1**
- **P-X-1203, Ramp 2 pitch**

The following parameters are required for diagnostics:

- **S-X-0124, Standstill window**
- **S-0-0182, Manufacturer class 3 diagnostics**

The Functional Principle of Drive Halt

If the drive halt function is activated, then the drive does not follow the command values of the active mode but itself brings the drive to a halt while maintaining the parametrized accel. The manner in which the standstill takes place depends on the previously activate operating mode.

The following relationship applies:

- The standstill is in position control with the use of the previously active limit accel and limit jerk, if a mode with drive-internal position command generation was active. Operating modes with drive-internal position command generation are drive-internal interpolation, relative drive-internal interpolation, positioning block mode and jog mode.
- Standstill takes place in position control with the use of accel in **S-X-0138, Bipolar acceleration limit value** an the jerk in **S-0-0349, Jerk limit bipolar**, if previously a position-control mode without drive-internal position command generation was active. Operating modes without drive-internal position command generation are position control, angle synchronization, step motor mode, and so on.
- The standstill takes place in velocity control and uses parameter **P-X-1201, Ramp 1 pitch**, **P-X-1202, Final speed of ramp 1** and **P-X-1203, Ramp 2 pitch,** if modes velocity control or torque control were previously active.

In all cases, the SS display reads **AH**, the diagnosis in S-0-0095 reads **A010 Drive HALT**.

If the actual velocity falls below the value of the parameter **S-X-0124, Standstill window**, the bit "Drive Halt Confirmation" will be set in

S-0-0182, Manufacturer class 3 diagnostics.

If the drive halt input is set back to "1", then the selected operating modes becomes active.

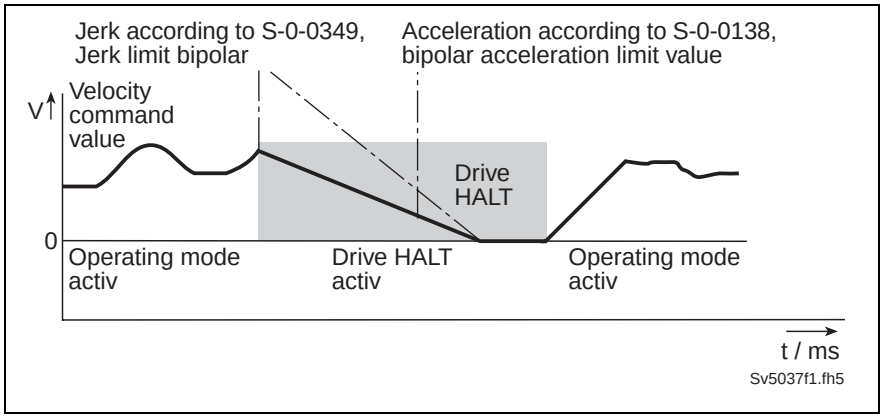


Fig. 8-62: Principle drive-halt with previously active position control without drive-internal position command value generation

The position-controlled deceleration is done with lag, if the previous operating mode was with a lag. In the other case, this feature proceeds without lagless control.

Connecting the drive halt input

The drive controllers are equipped with an input for connecting drive halt signals. These are on the plug-in module DAE02.x.

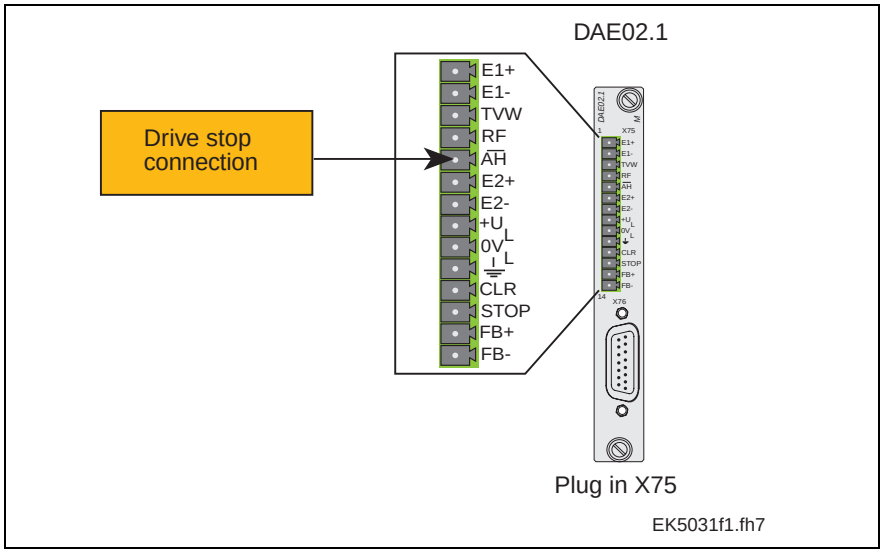


Fig. 8-63: Connecting drive halt signal to DAE module

8.8 Parameter Block Switching

Overview

Indramat main spindle drives are equipped with four switchable parameter blocks. One of the four blocks is always active. The switch takes place upon command from the control.

Application notes

Main spindle drives on powerful machine tools execute numerous tasks such as

- C axis modes
- positioning modes for machine tools at different gear ratios
- drive-guided gear transitions
- synchronous spindle modes for slicing or handing over turning parts while the spindle is running
- specific functions in variuos parts of the machining cycle

To meet the demands of these various tasks, the drive must be flexible and automated in operation for adaptation to a given task. This can be comfortably implemented with the parameter block transition function.

By switching into a different parameter block, the following activities are triggered.

- Operating mode changed (see modes)
- actiating the drive-controlled gear switches (see automated gearbox switching)
- activating the drive controller windings switch (see atuomated windings switch)

Pertinent Parameters

- **S-0-0217, Preselect parameter set command**
- **S-0-0216, D100 Switch parameter set command**
- **S-0-0254, Actual parameter set**
- **S-X-0219, IDN-list of parameter set**

How Parameter Block Switching Works

The switchable parameter block makes it possible to set the following drive features:

- speed command value ramp, two-stages with rise change threshold
- smoothing time constant for speed command smoothing
- velocity limit value
- window for "speed reached", spindle standstill and "position reached“
- speed controller settings (P-gain, integral action time)
- positon control settings (P-gain, positioning speed, lag error monitoring window)
- message threshold for drive loads
- pre-magnetization factor for adapting drive to servo (C axis) / spindle requirements
- gear ratios for switchable gears

Given the appropriate setting, it is possible to use the parameter block transition to trigger drive-controlled gear transitions or winding transitions.

Switchable Parameters

The following parameters can be switched:

- **S-X-0057, Position window**
- **S-X-0091, Bipolar velocity limit value**
- **S-X-0100, Velocity loop proportional gain**
- **S-X-0101, Velocity loop integral action time**
- **S-X-0104, Position loop Kv-factor**
- **S-X-0121, Input revolutions of load gear**
- **S-X-0122, Output revolutions of load gear**
- **S-X-0124, Standstill window**
- **S-X-0125, Velocity threshold nx**
- **S-X-0126, Torque threshold Tx**
- **S-X-0138, Bipolar acceleration limit value**
- **S-X-0154, Spindle position parameter**
- **S-X-0157, Velocity window**
- **S-X-0158, Power threshold Px**
- **S-X-0159, Monitoring window**
- **S-X-0218, Gear ratio preselection**
- **S-X-0222, Spindle positioning speed**

- **P-X-0004, Velocity loop smoothing time constant**
- **P-X-0176, Torque/Force command smoothing time constant**
- **P-X-0180, Rejection frequency velocity loop**
- **P-X-0181, Rejection bandwidth velocity loop**
- **P-X-0213, Analog input 1, assignment**
- **P-X-0214, Analog input 1, scaling per 10V full scale**
- **P-X-0215, Analog input 2, assignment**
- **P-X-0216, Analog input 2, scaling per 10V full scale**
- **P-X-0532, Premagnetization factor**
- **P-X-1201, Ramp 1 pitch**
- **P-X-1202, Final speed of ramp 1**
- **P-X-1203, Ramp 2 pitch**
- **P-X-1222, Velocity command filter**
- **P-X-1292, Switchable torque limit value**

Commissioning Parameter Block Switching

Executing parameter block switching

The parameter block switch is controlled with hardware inputs PAR1 / PAR2 on DEA04.2M. If the state changes, then "Switch parameter block command" is conducted. The following relationship applies:

Level at PAR0	Level at PAR1	Active parameter block
0 Volt	0 Volt	0
24 Volt	0 Volt	1
0 Volt	24 Volt	2
24 Volt	24 Volt	3

Fig. 8-64: Selecting a parameter block

Parameter block transition does not have to be parametrized. To check the function, use the following parameters:

S-0-0216, D100 Switch parameter set command

Data contents:	Comments:
11b	as long as parameter block transition is active
0b	otherwise

Fig. 8-65: Data contents S-0-0216

S-0-0217, Preselect parameter set command

Data contents:	Comments:
0b to 11b	this displays state of hardware inputs PAR1 / PAR2

Fig. 8-66: Data contents S-0-0217

S-X-0219, IDN-list of parameter set

Data contents:	Comments:
List of ID numbers	the list of all parameters is stored here which can be switched in this parameter block

Fig. 8-67: Data contents S-0-0219

S-0-0254, Actual parameter set

Data contents:	Comments:
0b to 11b	the currently active parameter block can be read out here

Fig. 8-68: Data contents S-0-0254

Diagnostics Messages

During the execution of the command, "d1" appears in the H1 display of the controller.

8.9 Drive-Controlled Homing

The position feedback value of the measuring system to be referenced forms a coordinate system referencing the machine axis. This system does not comply with the machine coordinate system after the drive has been initialized, as long as no absolute encoders are used.

Command **S-0-0148, C600 Drive controlled homing procedure command** thus supports

- in non-absolute measuring systems, establishing agreement between drive (measuring system) and the machine coordinate system;
- in absolute measuring systems, the drive-controlled running to the reference point

Drive-controlled homing means that the drive independently creates the necessary motion, which corresponds to the homing velocity settings and homing acceleration settings.

This feature can be executed for either the motor encoder or the optional encoder.

Drive-guided referencing can also be actuated with command spindle positioning if it is started with a non-referenced drive. Referencing takes place first concluded with a positioning to the desired spindle position (also see spindle positioning).

Pertinent Parameter

To run this feature, use the following parameters:

- **S-0-0148, C600 Drive controlled homing procedure command**
- **S-0-0147, Homing parameter**
- ***S-0-0298, Reference cam shift**
- ***S-0-0299, Home switch offset**
- **S-0-0052, Reference distance 1**
- **S-0-0054, Reference distance 2**
- **S-0-0150, Reference offset 1**
- **S-0-0151, Reference offset 2**
- **S-0-0041, Homing velocity**
- **S-0-0042, Homing acceleration**
- ***P-0-0153, Optimal distance home switch - reference mark**
- **S-0-0177, Absolute distance 1**
- **S-0-0178, Absolute distance 2**
- ***S-0-0165, Distance coded reference offset 1**
- ***S-0-0166, Distance coded reference offset 2**

(The parameters marked with * are only listed for informational reference and are not required for homing a rotary axis.)

The following parameters

- **S-0-0108, Feedrate override**
- **S-X-0057, Position window**
- **S-0-0349, Jerk limit bipolar**
- **S-0-0403, Position feedback value status**

also can be used.

Setting the referencing parameters

The basic sequence is dependent on how parameter **S-0-0147, Homing parameter** has been parametrized.

The following settings are performed:

- referencing direction positive/negative
- referencing with motor or optional encoder
- evaluation of the home switch yes/no
- evauation of the marker yes/no
- go to reference point yes/no

The parameter is structured as follows:

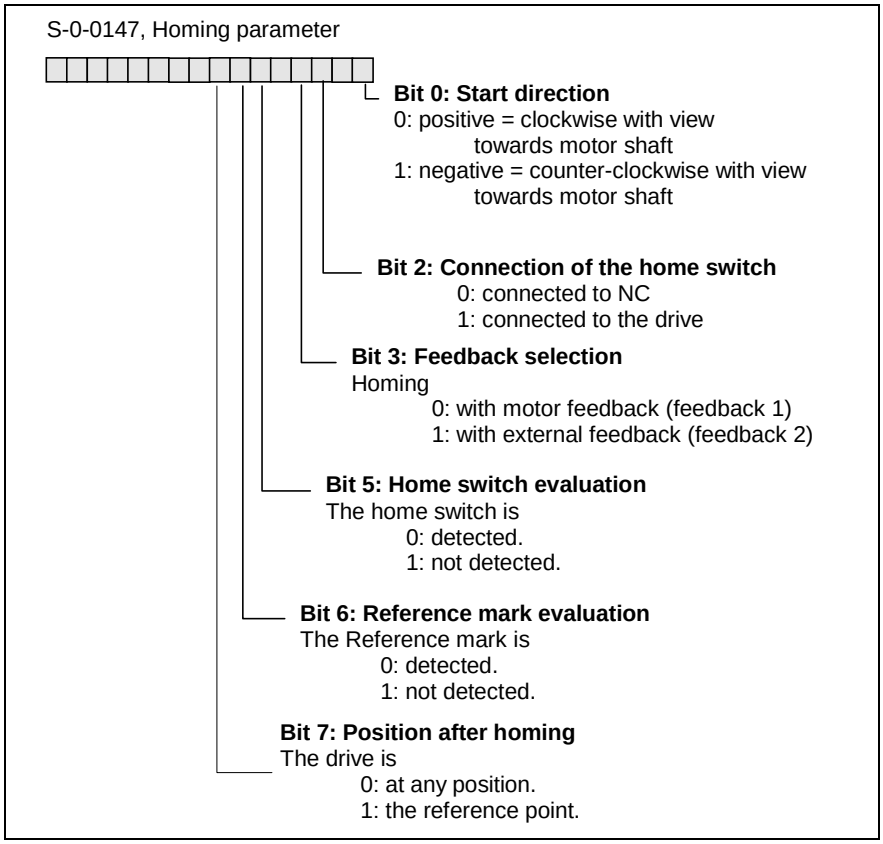

S-0-0147, Homing parameter
Bit 0: Start direction
0: positive = clockwise with view towards motor shaft
1: negative = counter-clockwise with view towards motor shaft
Bit 2: Connection of the home switch
0: connected to NC
1: connected to the drive
Bit 3: Feedback selection
Homing
0: with motor feedback (feedback 1)
1: with external feedback (feedback 2)
Bit 5: Home switch evaluation
The home switch is
0: detected.
1: not detected.
Bit 6: Reference mark evaluation
The Reference mark is
0: detected.
1: not detected.
Bit 7: Position after homing
The drive is
0: at any position.
1: the reference point.

Fig. 8-69: Structure of parameter S-0-0147, Homing parameter

The sequence also depends on the type and arrangement of the reference markers in terms of the referenced encoder.

The following homing procedures are significant to main spindle drives:

- referencing to motor encoder
- referencing to optional encoder (spindle encoder)
- referencing to home switch on spindle

Note: The exclusive evaluation of the home switch is only recommended with low precision demands. The combined evaluation of reference point switch and reference mark, to increase precision, is not possible with a rotary axis.

Overview of the Type and Allocation of Reference Marks of Non-Absolute Measuring Systems

For better a understanding, you can divide the measurement systems into 2 groups according to the type and configuration of their reference marks.

- **Type 1**: Measurement systems with absolute singleturn range, such as the Singleturn DSF or Resolver. These measurement systems have an absolute range of one encoder revolution or fractions of it (resolver). Typical systems are the encoders for the MHD, MKD and MKE motors and the GDS measurement system.
- **Type 2**: Incremental rotational measurement systems with a reference mark for each encoder rotation, such as, e.g., Indramat toothed-wheel encoder and the ROD or RON types.

The drive-internal detection for the configuration of the reference marks is done with the settings of the corresponding position encoder type parameter **S-0-0277, Position feedback 1 type** (for motor encoder) or **S-0-0115, Position feedback 2 type** (for optional encoder).

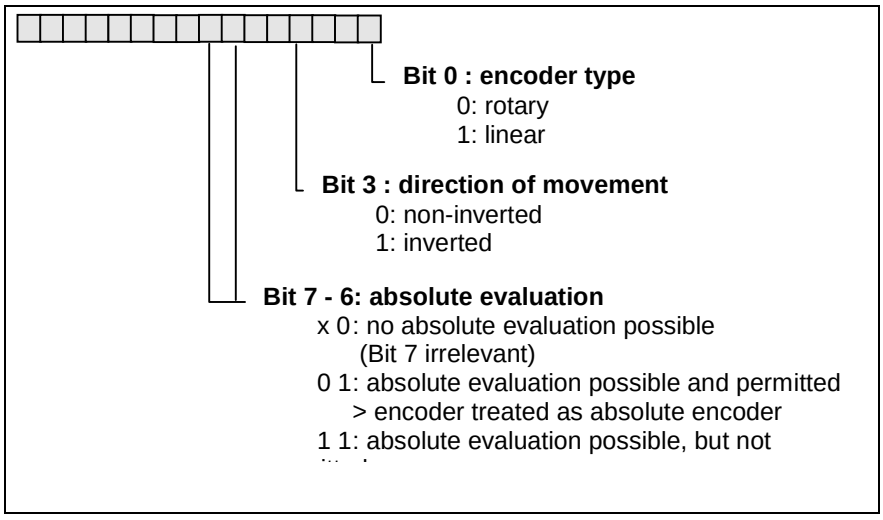

Bit 0 : encoder type
0: rotary
1: linear
Bit 3 : direction of movement
0: non-inverted
1: inverted
Bit 7 - 6: absolute evaluation
x 0: no absolute evaluation possible
(Bit 7 irrelevant)
0 1: absolute evaluation possible and permitted
> encoder treated as absolute encoder
1 1: absolute evaluation possible, but not

Fig. 8-70: Structure of the position feedback type parameters S-0-0115 / S-0-0277

For measurement systems with their own data memory (Type 1), this setting is done automatically.

See also chapter: "Setting the Measurement System".

Functional Principle of Drive-Controlled Referencing in Non-Absolute Measuring Systems

To establish congruency between drive (measuring system) and machine coordinate system it is necessary that the drive has precise information about its relative position within the machine coordinate system. The drive receives this information by detecting the home switch edge or the reference mark.

The compensation of the coordinate system is reified using a comparison with desired actual position at a specific point within the machine coordinate system and the actual positoin ("old" drive coordinate system).

This "certain" point within the coordinate system is the so-called reference point. The desired actual postion at this point is set with parameter **S-0-0052, Reference distance 1** (for motor encoders) or **S-0-0054, Reference distance 2** (for optionalen encoders. The physical positioin of the reference pont results from the position of the reference mark plus the value in **S-0-0150, Reference offset 1** or **S-0-0151, Reference offset 2**.

After detecting the reference mark, the drive knows the position of the mark and thus also the reference point in the "old" drive coordinate system. The desired position is specified in parameter **S-0-0052/ S-0-0054**.

The difference between both systems is added onto the "old" system. Both systems then agree.

By switching the position command and feedback value, **S-0-0403, Position feedback value status** is set to 1. This means that the feedback position value now refers to the machine zero point.

Note: If the drive, once the reference command has been conducted, is in parameter mode again, then parameter **S-0-0403, Position feedback value status** is set to 0, because the feedback values in command **S-0-0128, C200 Communication phase 4 transition check** are re-initialized.

Functional Principle of Drive-Guided Referencing with Absolute Measuring Systems

If the referenced measuring systems (per bit 3 of S-0-0147) is to be evaluated as an absolute measuring system, i.e., in the relevant encoder type parameter (S-0-0277/S-0-0115) bit 6 is at "1“ and bit 7 on "0“, then command **S-0-0148, C600 Drive controlled homing procedure command** supports two different purposes**:**

- drive-guided traveling to the reference point
- resolution of the actual position value if absolute measurement is conducted with drive enable applied.

Drive-guided traveling to reference point

If the absolute encoder is referenced, i.e., parameter **S-0-0403, Position feedback value status** is set to "1", then the drive, after start of command **S-0-0148, C600 Drive controlled homing procedure command** itself runs to the reference point if "1" is set in bit 7 of parameter **S-0-0147, Homing parameter** for "Drive on reference point after drive-guided referencing". The reference point is defined in parameters **S-0-0052, Reference distance 1** or **S-0-0054, Reference distance 2**.

Triggering actual position value switch with absolute dimension set

If command **P-0-0012, C300 Command 'Set absolute measurement'** is conducted with drive enable applied, then the actual switching by the drive of the actual position value register (S-0-0051, **Position feedback 1 value** or S-0-0053, **Position feedback 2 value**) is not conducted until

- command **S-0-0148, C600 Drive controlled homing procedure command** is also conducted after the start of P-0-0012 or
- drive enable is switched off.

(See section: "Set absolute dimension“)

Sequence control "Drive-Controlled Homing"

The command profile depends on the parameters

- **S-0-0041, Homing velocity,**
- **S-0-0108, Feedrate override and**
- **S-0-0042, Homing acceleration.**

To limit the acceleration changes, you can additionally activate a jerk limit. You can do this by entering the parameter **S-0-0349, Jerk limit bipolar**.

The following diagram explains this:

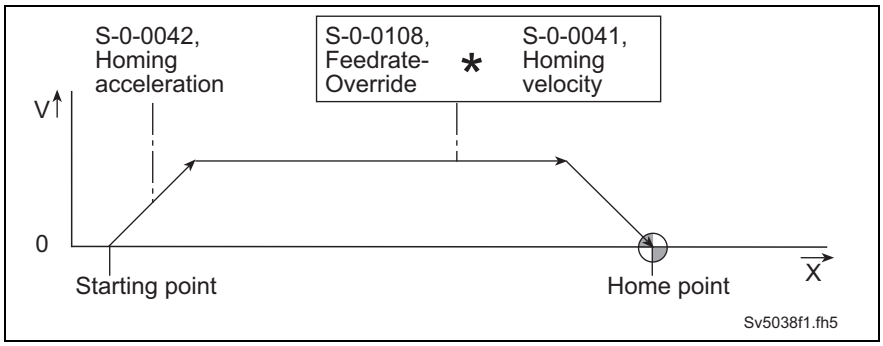


Fig. 8-71: Position command profile with homing velocity and homing acceleration

The maximum velocity is influenced, like with all drive-controlled functions, by the feedrate. The effective maximum velocity is the result of the product of **S-0-0041, Homing velocity** and **S-0-0108, Feedrate override**.

If zero has been entered in parameter **S-0-0108, Feedrate override** then warning **E255 Feedrate-override S-0-0108 = 0** is generated.

The motional process during drive-controlled homing of non-absolute encoders can be made up of up to three processes:

- If the home switch evaluation process has been activated, then the drive accelerates to the homing velocity in the selected homing direction until the positive home switch edge is detected. If the drive is already on the home switch at the start of drive-controlled referencing (**S-0-0400, Home switch** = 1), the drive at first accelerates in the opposite direction until the negative home switch edge is detected, and then reverses the direction.

- If real reference markers are available (type 2, see above), and if the reference marker evaluation is activated, then the drive runs in homing direction until it detects a reference marker.
- What happens now depends on the setting in bit 7 in **S-0-0147, Homing parameter**. If a "0" has been programmed there ("and position after referencing"), then the drive decels at programmed referencing acceleration rate until standstill. If the value of the actual velocity exceeds the value in **S-X-0124, Standstill window**, then the coordinate system is switched to the referencing encoder and the command is signalled as being completed. If a "1" has been programmed in bit 7, ("Drive runs to reference point"), then the drive positons to the reference point. This point is defined in terms of the position of the reference mark plust he relevant reference dimension offset (S-0-0150/S-0-0151). The transition of the coordinate syste and the signal of completion of command come when the drive-internal position command value has reached the target value and the difference between actual position and target values is smaller than the value in **S-X-0057, Position window**.

The following illustrates the sequence for "Drive goes to reference point"

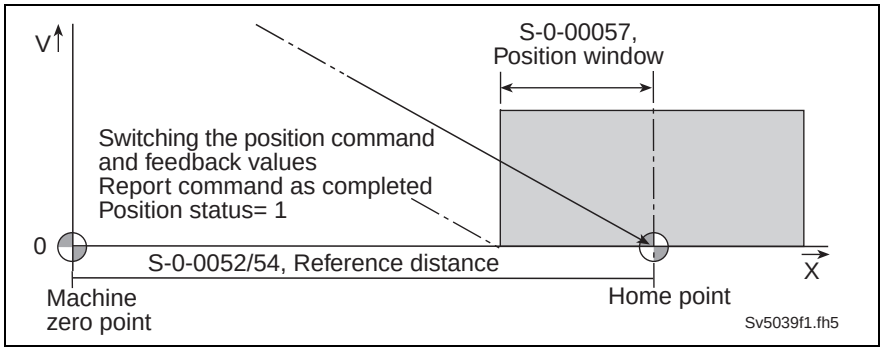


Fig. 8-72: Switching of position command and actual feedback values

Actual Feedback Values After the "Drive-Controlled Homing" Command

The position feedback values from the motor and optional encoders, after the drive-controlled homing command is processed, depend on bit 3 in **S-0-0147, Homing parameter** and on the availability of an absolute encoder as a motor or optional encoder.

Motor encoder:	Ext. encoder:	S-0-0147 Bit 3:	Actual feedback value 1:	Actual feedback value 2:
absolute	not absolute	1	unchanged	reference distance 2
not absolute	absolute	0	reference distance 1	unchanged
not absolute	not absolute	0	reference distance 1	reference distance 1
not absolute	not absolute	1	reference distance 2	reference distance 2

Fig. 8-73: Position feedback values after the drive-controlled homing command

Commissioning with Evaluation of reference marker or home switch edge

It can be selected whether

- home switch evaluation and/or
- reference mark evaluation is desired or not.

The combined evaluation of home switch and reference mark is not possible with rotary axes.

It must be additionally defined

- in which direction the drive should move with the start of the command "Drive-controlled homing" as well as whether
- the drive should go to the reference point or not.

If a home switch evaluation becomes necessary, then the necessary settings must first be made (see "Evaluation of the Home Switch"). All additional steps can then be conducted as follows:

⇒ Check the relevant position encoder type parameter (S-0-0277 / S-0-0115) to make sure it has been correctly set.

⇒ Parameter **S-0-0052, Reference distance 1** or **S-0-0054, Reference distance 2** and parameter **S-0-0150, Reference offset 1** or **S-0-0151, Reference offset 2** must be parametrized with "0".

⇒ Set parameters **S-0-0041, Homing velocity** and **S-0-0042, Homing acceleration** to small values (e.g., S-0-0041 = 10 Rpm, S-0-0042 = 10 rad/s².

⇒ Conduct the drive-controlled homing command.

Note: If the command is cleared, then the original operating mode becomes active. If **drive-internal interpolation** is set, then the drive immediately runs to the value set in **S-0-0258, Target position**. This value relates to the new (machine zero point) coordinate system!

The command should be completed without error. The machine zero point is at the position of the home switch or the referencing point as the reference distances (S-0-0052/54) have been parametrized with 0. The position feedback value in **S-0-0051, Position feedback 1 value** or **S-0-0053, Position feedback 2 value** should now have absolute reference to this preliminary machine zero point.

To set the correct machine zero point, you can now conduct the following steps:

⇒ Run the axis to the desired machine zero point and set the feedback position value displayed there with opposite sign in **S-0-0052, Reference distance 1** or **S-0-0054, Reference distance 2.**

Or:

⇒ Run the axis to position feedback value = 0, measure the distance between the current position and the desired machine zero point. Enter the distance in **S-0-0052, Reference distance 1** or **S-0-0054, Reference distance 2.**

Once the drive-controlled reference command is again completed, the position feedback value should refer to the desired machine zero point.

The reference point can be shifted relatively to the reference mark (see "Consideration of the reference offset").

Parameter **S-0-0041, Homing velocity** and **S-0-0042, Homing acceleration** can now be set to their final values.

Consideration of the Reference Offset

If the evaluation of the reference mark is activated in the homing parameter, then the reference point is always set on the position of the selected reference mark. You can shift the position of the reference point relatively to the reference marker. Doing so, you can select any position after homing.

The offset is set with the parameters

- **Reference Offset 1** (for motor encoder)
- **Reference Offset 2** (for optional encoder)

If the **reference offset is positive**, then its drive-internal direction is positive (see "Command Polarities and Actual Value Polarities"). In other words, the reference point is moved in terms of the reference mark in a clockwise direction when looking towards the motor shaft. If the homing direction is also positive, then the drive does not reverse the direction after passing the reference marker.

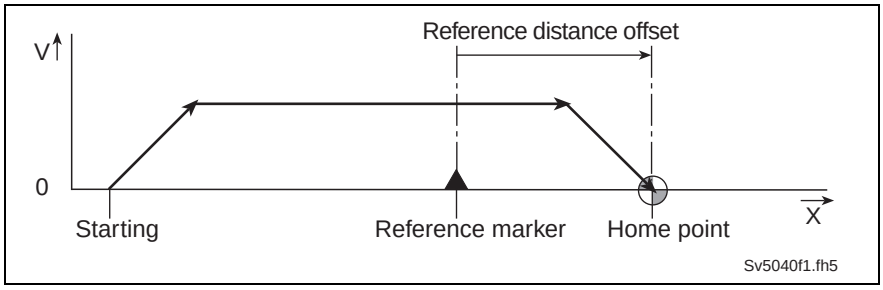


Fig. 8-74: Command value profile for positive reference offset and positive homing direction

If the **reference direction is negative**, then the drive can reverse the direction (with types 2 and 3) after passing the reference marker.

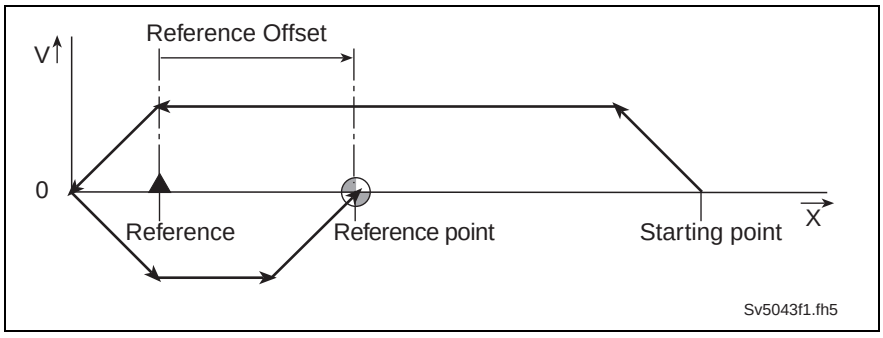


Fig. 8-75: Command profile for positive reference offset and negative homing direction

If the **reference offset is negative**, then its drive-internal direction is negative (see chapter: "Command Polarities and Actual Value Polarities"). In other words, the reference point is shifted counterclockwise looking towards the motor shaft. If the reference direction is negative, then the drive does not reverse the travel direction once it has passed the reference marker.

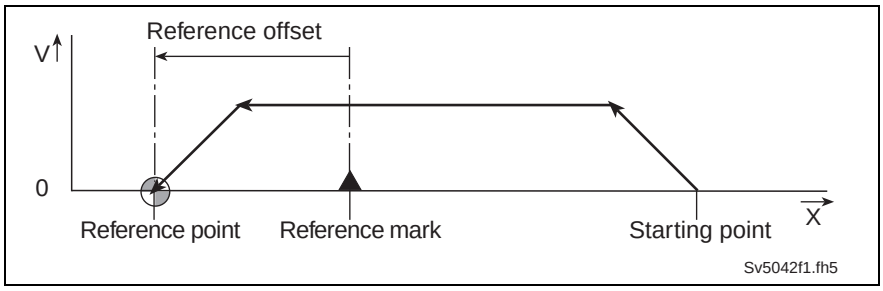


Fig. 8-76: Command profile with negative reference offset and negative homing direction

If the referencing direction is positive, then the drive can reverse the travel direction (with types 2 and 3) after passing the reference marker.

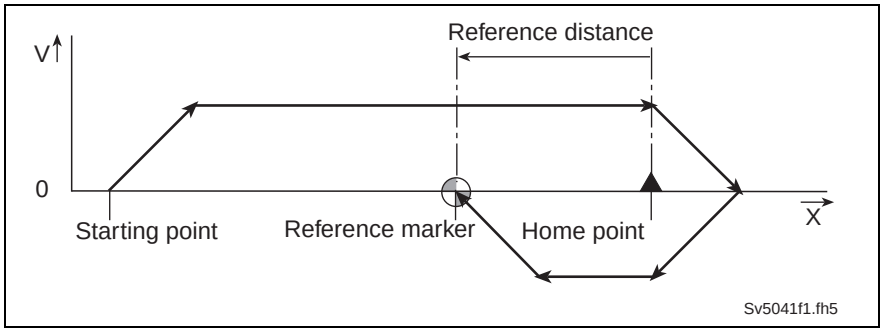


Fig. 8-77: Command profile with negative reference offset and positive homing direction

Evaluation of the Home Switch

A spindle coupled via a gear ratio can be positioned with this switch.

The home switch input is pictured in parameter **S-0-0400, Home switch**.

If **home switch evaluation is activated**, the drive searches for the positive edge of the home switch. If the home switch is not actuated at the beginning of the command, the drive moves in the preset homing direction.

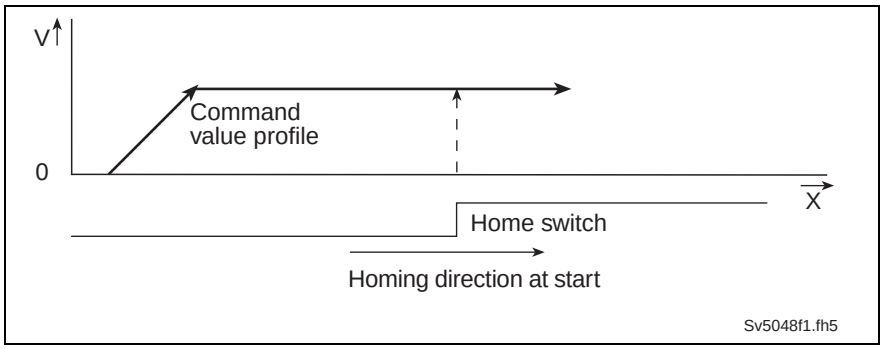


Fig. 8-78: Start of the command when switch not actuated

Command value profile with actuated home switch at the start of the command

If the home switch is actuated already when the command is started, the drive generates command values in the opposite direction to move away from the home switch. As soon as a 1-0 edge from the home switch is detected, the drive reverses its direction and continues as if started outside the home switch range.

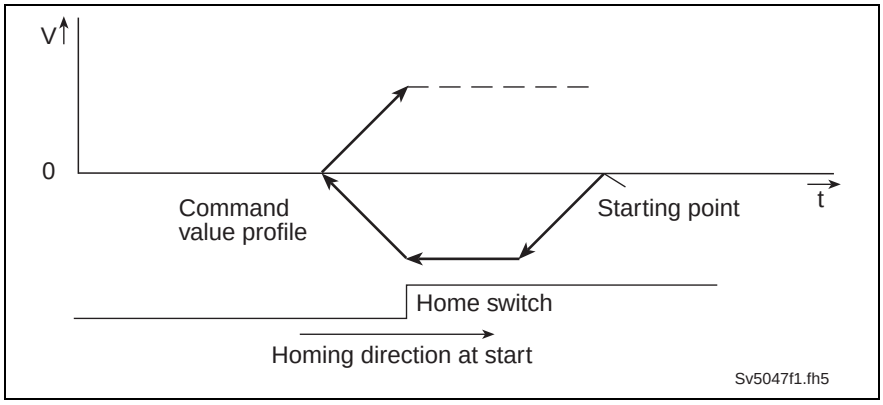


Fig. 8-79: Command profile with start position on the home switch

What the User should do with "Drive-guided Referencing"

Starting, interrupting and completing the command "Drive-Controlled Homing"

This feature is implemented as a command.

To start the feature, you must set and execute the command by writing to the parameter **S-0-0148, C600 Drive controlled homing procedure command** (Input = 3 = 11bin). The drive confirmation has to be received from the data status out of the same parameter. The command is finished when the command-change bit in the drive status word is set and the confirmation changes from *in process* (7) to *command executed* (3) or to *command error* (0xF).

If the command is interrupted (Input = 1) during processing (when confirmation = 7), the drive responds by activating the drive halt feature. The program continues if the interruption is canceled.

(See also chapter: "Drive Stop".)

Possible Error Messages During "Drive-Controlled Homing"

During the execution of the command, the following command errors can occur:

- **C601 Homing only possible with drive enable**
  While starting the command, the controller enable was not set.
- **C602 Distance home switch - reference mark erroneous**
  The distance between home switch and reference mark is too small.
- **C604 Homing of absolute encoder not possible**
  The homing encoder is an absolute encoder. The command "Drive-Controlled Homing" was started without first starting the command "Set Absolute Measuring".

Connection of the Home switch

DIAX ASE:

The home switch is connected on E12 (pin 1) of the X17 connector on the DEA 4.1 module.

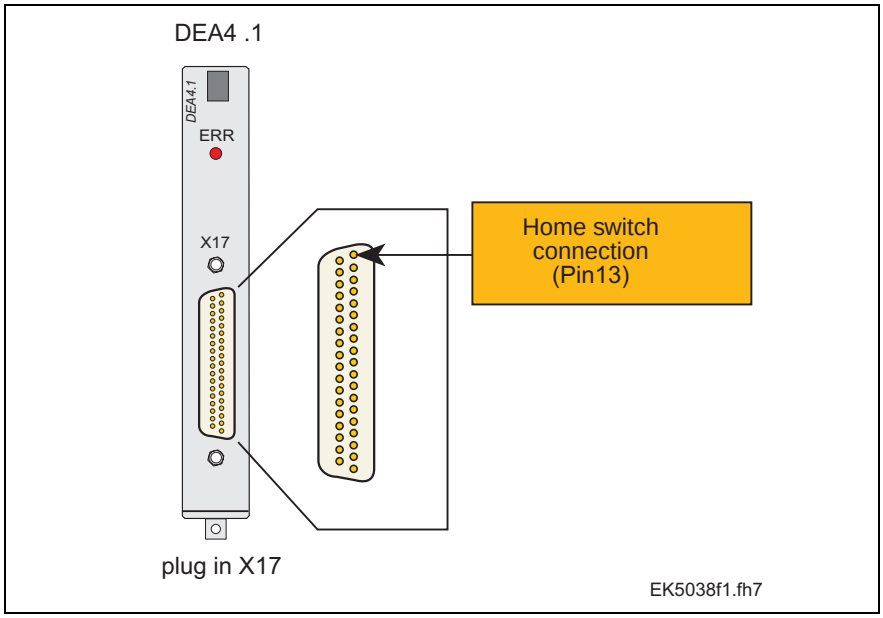


Fig. 8-80: Connection of the home switch to the DEA

8.10 Set Absolute Measuring

When an absolute measuring system is installed, its position feedback value displays a value that is arbitrary and has no relationship to the machine's zero point. In this case, the value of the **S-0-0403, Position feedback value status** parameter is 0.

In contrast to non-absolute measuring systems, the absolute dimensions in absoute measuring systems are established only once at the initial start-up of an axis.

The position feedback value of this measurement system can be set to the desired value with the command "Set Absolute Measuring." After absolute measuring (dimension) is set, the position feedback value of the encoder has a defined relationship to the machine's zero point.

All information will be available after reset because all necessary data from the absolute dimension system is stored in encoder data memory or in parameter data memory. The position feedback value retains its reference to the machine's zero point.

The following parameter is available for executing the function:

- **P-0-0012, C300 Command 'Set absolute Measurement'**

In addition, the following parameters are needed or are affected by the function:

- **S-0-0147, Homing Parameter**
- **S-0-0052, Reference distance 1**
- **S-0-0054, Reference distance 2**
- **S-0-0403, Position feedback value status**

Function Principle Set Absolute Measuring

The feedback connected to the mechanical system is brought to an exactly measured position. The value desired for the position feedback value of the measurement system is entered in the parameter **S-0-0052, Reference distance 1** (for motor encoder) or **S-0-0054, Reference distance 2** (for optional encoder). Then the command **P-0-0012, C300 Command 'Set absolute Measurement'** is started. The position feedback value is set to the value in the respective reference distance and the position status becomes 1.

If only one absolute measurement system is available, the command automatically refers to this measurement system. If 2 absolute measurement systems are connected, the selection is conducted according to bit 3 of **S-0-0147, Homing Parameter**.

When the command is executed, 3 different cases can be distinguished :

1. Set absolute measuring without drive enable.
2. Set absolute measuring with drive enable, function executed by subsequently starting the command "Drive Controlled Homing Procedure".
3. Set absolute measuring with drive enable, function executed by subsequently clearing the drive enable.

Set absolute measuring without controller enable

When absolute measuring is set without drive enable, the axis is moved to the exactly measured position and, while the drive enable is turned off, the command **P-0-0012, C300 Command 'Set absolute Measurement'** is started, after the reference distance has been written with the desired position feedback value at this position.

The command immediately sets the position feedback value of the measurement system to the reference distance, and the position status becomes 1. The command is finished in the drive and can be cleared.

Normally, this simple method of executing the command is all you need. However, if the application is dealing with a "vertical axis" (vertical) or if the approached position cannot be held without drive enable for another reason, the command can also be done with drive enable under specific conditions.

(See 2. or 3. from: Set Absolute Measuring Functional Principle.)

Setting Absolute Dimension Under Controller Enable and Subsequent "Drive-Controlled Homing"

Homing: Setting absolute dimension command, the position feedback value of a controlled axis can be changed. This may be necessary with "vertical axis," for example.

The procedure is as follows :

- Move the axis to the measured position.
- Enter the desired position feedback value in the appropriate reference distance parameter.
- Start the command **P-0-0012, C300 Command 'Set absolute Measurement'** The position data will not be switched yet.

- Start the command **S-0-0148, C600 Drive controlled homing procedure command** this feature recognizes that it is dealing with an absolute measurement system and executes "Set Absolute Dimension" or, in other words, the position feedback value is set to the reference distance. The position command value (**S-0-0147, Homing Parameter**) is simultaneously set to the same value. As with each execution of "drive-controlled homing," the position command value is read via the service channel and the control system's position command value is set to this value before the homing command is cleared.

  Warning:
  Make sure that the encoder to be set is selected in bit 3 of **S-0-0147, Homing Parameter**

- Clear the command **P-0-0012, C300 Command 'Set absolute Measurement'**

Set absolute dimension (measuring) during controller enable, then turn off the controller enable

Setting absolute measuring: with CE and subsequent CE switch off, the position feedback value of a controlled axis can be changed. Switching the position feedback value occurs after the drive enable is turned off.

The procedure is as follows :

- Move the axis to the measured position
- Enter the desired position feedback value in the appropriate reference distance parameter.
- Start the command **P-0-0012, C300 Command 'Set absolute Measurement'** (Measuring). The position data will not be switched yet.
- Turn off the drive enable, the position feedback value is set to the reference distance, the command is terminated in the drive.
- Clear the command **P-0-0012, C300 Command 'Set absolute Measurement'**

Set the actual feedback values according to the absolute dimension

The state of the position feedback values from the motor encoder and, if present, from the optional encoder after executing the set absolute dimension command, depends on bit 3 in **S-0-0147, Homing Parameter** and the availability of an absolute encoder as the motor encoder or optional encoder.

Motor encoder:	Optional encoder:	S-0-0147 bit 3:	Position feedback value 1:	Position feedback value 2:
Absolute	Non-absolute or not available	Any value	Reference distance 1	Reference distance 1
Non-absolute	Absolute	Any value	Reference distance 2	Reference distance 2
Absolute	Absolute	0	Reference distance 1	Unchanged
Absolute	Absolute	1	Unchanged	Reference distance 2

Fig. 8-81: Set position feedback values according to absolute measuring

Actual feedback values from absolute encoder after switching on

(See also "Position Feedback Values of Absolute Measurement Systems After Initialization".)

Diagnostic messages

While the command is being executed, the following command error(s) can occur:

- **C302 Absolute measuring system not installed**. The command **P-0-0012, C300 Command 'Set absolute Measurement'** has been started without an absolute measurement system being available.

Notes

9 Optional Drive Functions

9.1 Configurable Signal Status Word

The configurable signal status word supports the acceptance of a maximum of 16 copies of bits from other drive parameters. This makes it possible for a user to put a bit list together which contains status information of the drive that important to the control.

Pertinent Parameters

These parameters are used with this function:

- **S-0-0144, Signal status word**,
  The desired bits are applied there.
- **S-0-0026, Configuration list signal status word,**
  ID number list with variable length to configure the bit strip.
- **S-0-0328, Assign list signal status word**
- Bit number list with variable length to configure the bit strip.

Configuration of the Signal Status Word

Configuration of the ID number

Parameters **S-0-0026, Configuration list signal status word** and **S-0-0328, Assign list signal status word** are used to configure the signal status word. These parameters have a variable length of two byte data elements.

The ID numbers of the parameters which contain the original bits (sources) are specified in parameter **S-0-0026, Configuration list signal status word.** The position of an ID number in the list determines the bit in the signal status word to which the ID number applies. So the first list element informs as to what parameter bit 0 of the signal status word comes from.

Configuring the bit numbers

Which bit of the parameters selected in **S-0-0026, Configuration list signal status word** is to be copied into the signal status word is determined in **S-0-0328, Assign list signal status word**.

Note: If this list remains empty, then bit 0 of the parameter is automatically copied. Otherwise, the bit taken out of the source parameter is specified here.

Bit number 0 (LSB) to 31 (MSB) can be specified. For each bit number of this list there must be an ID number in the same list position in list S-0-0026. Otherwise, the drive, when writing the bit number list, will issue the error message "ID number not available". This is why list **S-0-0026, Configuration list signal status word** must be written into before **S-0-0328, Assign list signal status word**.

Example: A signal status word with the following configuration must be put together:

Bit no. in S-0-0144,Signal status word	ID number of original parameter	Bit no. of original parameter	Definition
0	S-0-0013	1	Vist = 0
1	S-0-0182	6	IZP
2	S-0-0403	0	position status
3	P-0-0016	4	P-0-0015 specifying memory address of a drive-internal counter. Transmission is from bit 4.

Fig. 9-1: Example of a configurable signal status word

Note: A maximum of 16 bits can be configured. Configuration is performed from the least-significant to most-significant bit. In other words, the position of the bit copy in the signal status word is the result of the continuous configuration in S-0-0026.

Diagnostic / Error Messages

The following checks are run when inputting parameters **S-0-0328, Assign list signal status word** or **S-0-0026, Configuration list signal status word**:

- If more elements are programmed in **S-0-0328, Assign list signal status word** than **S-0-0026, Configuration list signal status word** then error message "*0x1001, ID number not available*" is generated.
- If an ID number specified in **S-0-0026, Configuration list signal status word** does not exist, then error message "*0x1001, ID number not available*" is generated.
- Check whether the IDN variable data length (list parameters) specified in **S-0-0026, Configuration list signal status word** exists or a socalled online read function. Parameters with online read function are generally parameters with physical units (position, speed, acceleration and currents) as well as parameters **S-0-0135, Drive status word** and **S-0-0011, Class 1 diagnostics**. If yes, then service channel error message *0x7008, Data not correct* is generated.

Note: In each of these cases, only the inputs up until the faulty element is accepted!

9.2 Analog Output

With the help of the function "Analog output" drive-internal signals and state variables can be generated as analog voltage signals. These can be examined with an oscilloscope connected to the analog outputs.

The conversion of the digital values from the drive is done via two 8 bit digital-to-analog converters. The maximum output voltage equals +/- 10 volts. There is an output every 250 usec.

Possible output functions

1. Direct writing into the analog outputs
2. Assigning ID numbers to analog outputs
3. Output of pre-set signals
4. Byte output of RAM memory cell
5. Bit output of RAM memory cells

To parametrize the function, the following parameters are available:

- **P-0-0139, Analog output 1**
- **P-0-0140, Analog output 2**
- **P-0-0420, Analog output 1, signal selection**
- **P-0-0421, Analog output 1, expanded signal selection**
- **P-0-0422 Analog output 1, scaling**
- **P-0-0423, Analog output 2, signal selection**
- **P-0-0424, Analog output 2, expanded signal selection**
- **P-0-0425, Analog output 2, scaling**
- **P-0-0426 Analog outputs, IDN list of assignable parameters**

Direct analog outputs

With the parameters **P-0-0139, Analog output 1** and **P-0-0140, Analog output 2** it is possible for the control to use the two 8 bit digital/analog converters of the drive. Voltage values written into these parameters, ranging between -10.000 volts and +10.000 volts, are output by the drive to the analog outputs. The quantization equals 78 mV.

A precondition for the use of an analog output is that the signal selection (P-0-0420 or P-0-0423) and the expanded signal selection (P-0-0421 or P-0-0424) were deactivated by inputting 0 for the used channel.

Analog output of existing parameters

selection list

All parameters in the list **P-0-0426 Analog output, IDN list of assignable parameters** can be output analog.

configuration

This first requires that their ID number be input in the signal select for channel 1 (P-0-0420) or 2 (P-0-0423). The unit and the attribute (number of decimal places) of the relevant scaling (P-0-0422 or P-0-0425) is set as per the selected parameter. If the selected parameter depends on a scaling mode, then the settings there apply to the scaling as well.

scaling

With **P-0-0422 Analog output 1, scaling** or **P-0-0425, Analog output 2, scaling** is it then fixed at what value 10 volts are output.

For example, for rotary preferred position scaling and signal selection position command (S-0-0047), the unit of the scaling factor is set to degrees, and the number of decimal places is set to four. Inputting 90.0000 degrees in the evaluation factor means that 10 volts per 90 degrees at the load will be output .

If signals with a binary format are selected (e.g., **S-0-0134, Master control word)** then the display format of the scaling is set to decimal without fractional part. There is no unit. With this scaling, a bit number between 0 and 15 is selected. The state of this bit of the set parameter is then output in such a way that for logical 0 -10 volts are output and for logical 1 +10 volts (bit output).

Outputting pre-set signals

To be able to show such signals in an analog manner, which do not exist as a parameter, there a way to select these via predefined signal numbers and to output these via the expanded analog output.

The parameters

- **P-0-0421, Analog output 1, expanded signal selection** and
- **P-0-0424, Analog output 2, expanded signal selection**

do the selection.

Activation of the expanded output

The expanded output only functions if the signal select for the channel used (P-0-0420 or P-0-0423) is deactivated by inputting the ID number 0.

The following list shows which signal is output with which signal number.

Signal number P-0-0421/424	Output signal	Reference unit: Evaluation factor 1.0000
0x00000001	motor encoder sine signal	0.5V/10V
0x00000002	motor encoder cosine signal	0.5V/10V
0x00000003	Opt. enc. sine signal	0.5V/10V
0x00000004	Opt. enc. sine cosine	0.5V/10V
0x00000005	Position command difference on the pos. controler	rot. ⇒ 1000rpm/10V lin. ⇒ 100m/min/10V
0x00000006	DC bus power	1kW/10V
0x00000007	absolute DC bus power amount	1kW/10V
0x00000008	effective current	S-0-0110/10V
0x00000009	relative current	S-0-0110/10V
0x0000000a	thermal load	100 % / 10V
0x0000000b	motor temperature	150°C/10V
0x0000000c	magnetizing current	S-0-0110/10V
0x0000000d	velocity command at the velocity controller	rot. ⇒ 1000rpm/10V lin. ⇒ 100m/min/10V

Fig. 9-2: Signal selection list with pre-defined signal selection

See also Control loop structure in chapter General Information for Control Loop Settings

This information is scaling independent and always relates to the motor shaft. The scaling of the signals is possible via the parameters **P-0-0422 Analog output 1, scaling** and **P-0-0425 Analog output 2, scaling.** These have been set as factors with 4 decimal places in the expanded signal selection. If the evaluation factors are 1.0000, then the standards specified in the table apply.

Example:

Output of the position command difference with a value of 150rpm/10V on channel 1.

Input:

P-0-0420, Analog output 1, signal selection = S-0-0000

P-0-0421, Analog output 1, expanded signal selection = 0x00000005

P-0-0422 Analog output 1, scaling = 0.1500

Bit and byte outputs of the data memory

Note: Use of this feature is meaningful only with information about the structure of the internal data memory; therefore, this feature can be used effectively only by the corresponding developer

activation of the bit and byte output

The bit and byte output is only possible if the signal selection for the used channel (P-0-0420 or P-0-0423) is deactivated by inputting the ID number 0.

configuration

The selection of the function and the storage address takes place in the parameters

- **P-0-0421, Analog output 1, expanded signal selection** and
- **P-0-0424, Analog output 2, expanded signal selection.**

In the high nibble (half byte with bits 28..31), byte output is activated with a 1 and bit output with a 2. The least significant 24 bit of the parameter inputs the storage address.

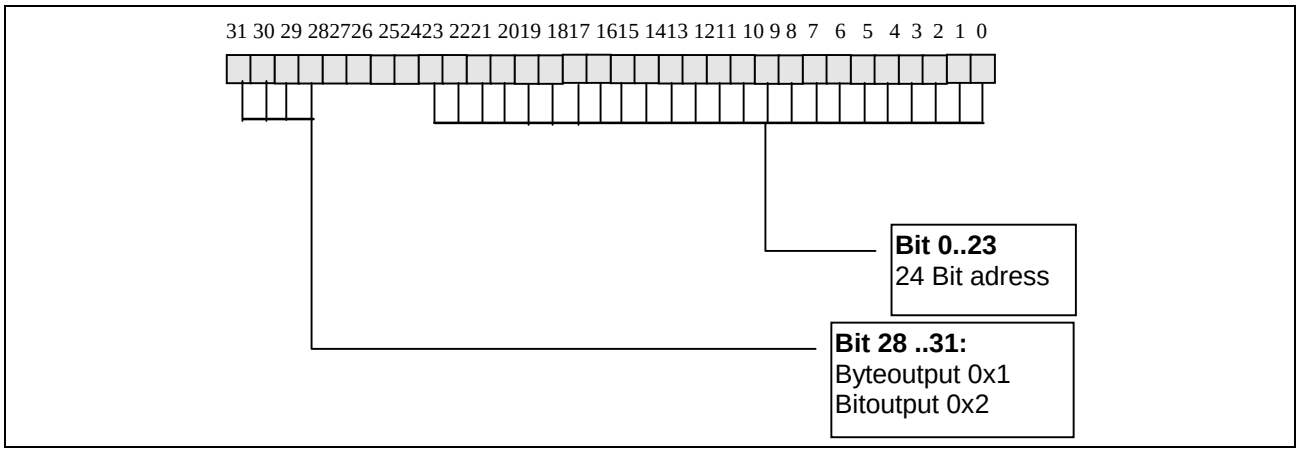


Fig. 9-3: Parametrizing bit or byte output

scaling

The parameters

P-0-0422 Analog output 1, scaling and

P-0-0425 Analog output 2, scaling

either select the bit to be output or it can be determined from which (least signifiant) bit on the byte to be generated will start. When selecting the bit number, only values between 0 and 15 make sense. If greater values are entered, then only bits 0..3 are used.

When outputting bits, -10 volt (bit = 0) or +10 volt (bit = 1) is output.

Byte output

With byte outputs, the MSB of the byte to be output is interpreted as sign bit. Voltages ranging from -10 to +10 volts are output.

Terminal assignment - analog output

The output of the analog signals uses connector X3 of the basic unit.

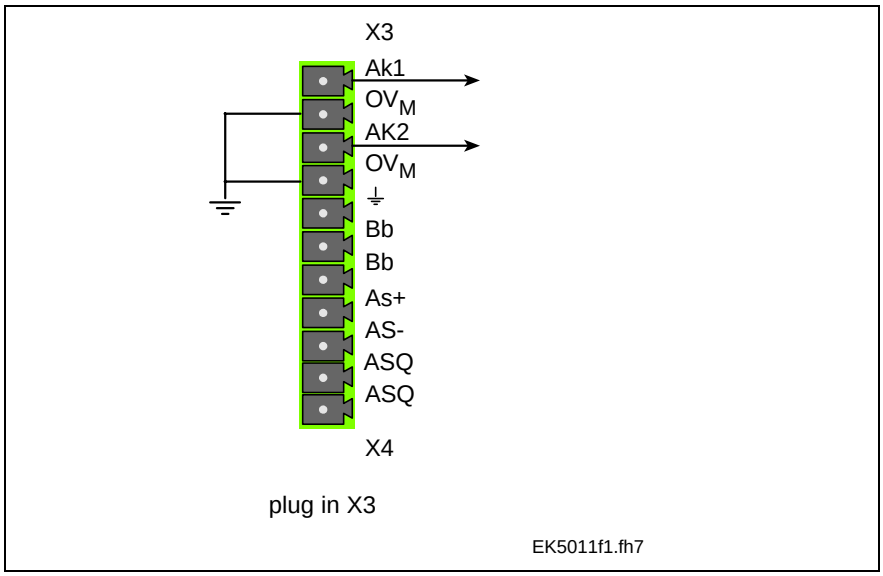


Fig. 9-4: Terminal assignment of analog output

9.3 Analog Inputs

Using the function "Analog inputs", two analog inputs can be shown via analog/digital converters in one parameter each. The analog voltages, in the form of both of these parameters, can then either be

- transmitted to the control and supports the control as an analog input function or
- it can be assigned in the drive to a different parameter taking a settable scaling and a settable offset into account.

Note: The analog inputs can be used, for example, to set torque limits or speed command values for the velocity control mode.

The following parmeters are available for the function:

- **P-0-0210, Analog input 1**
- **P-0-0211, Analog input 2**
- **P-0-0212, Analog inputs, IDN list of assignable parameters**
- **P-X-0213, Analog input 1, Assignment**
- **P-X-0214, Analog input 1, Scaling per 10V**
- **P-X-0215, Analog input 2, Assignment**
- **P-X-0216, Analog input 2, Scaling per 10V**
- **P-0-0217, Analog input 1, Offset**
- **P-0-0218, Analog input 2, Offset**

The analog channels can be set individually in each parameter block.

Functional principle of the analog inputs

The two analog inputs are connectet over two **differential inputs** E1+ / E1- and E2+ / E2- .

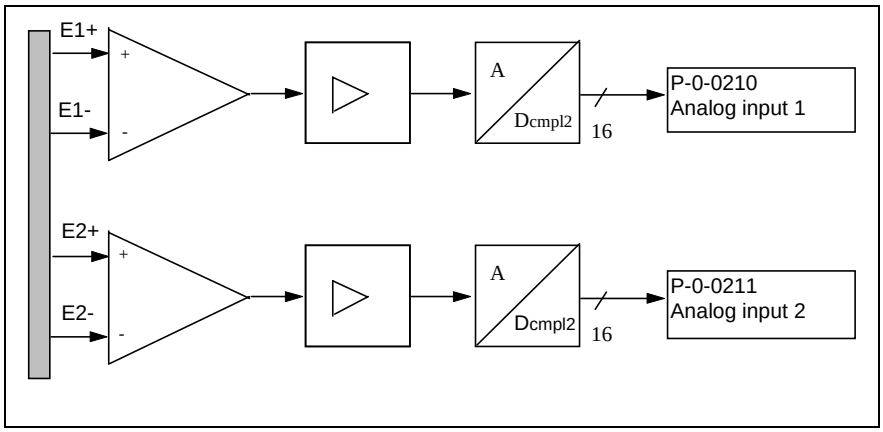


Fig. 9-5: Functinal principle of the analog inputs

The digitalized voltages of both differential inouts are displayed in the parameters **P-0-0210, Analog input 1** and **P-0-0211 Analog input 2.** The analog/digital conversion is performed via a two channel 14Bit ADC with fourfold oversampling.

Assignment of analog inputs to parameters

Both **P-0-0210, analog input 1** and **P-0-0211 analog input 2**, which depict the analog-to-digital converted voltages, can be assigned to other drive parameters, i.e., they can be cyclically copied while taking

- an offset and
- a selectable scaling

into account.

Note: Analog channel 1 is processed every 250 µs, channel 2 every 8 ms.

The assignment applies the following principle:

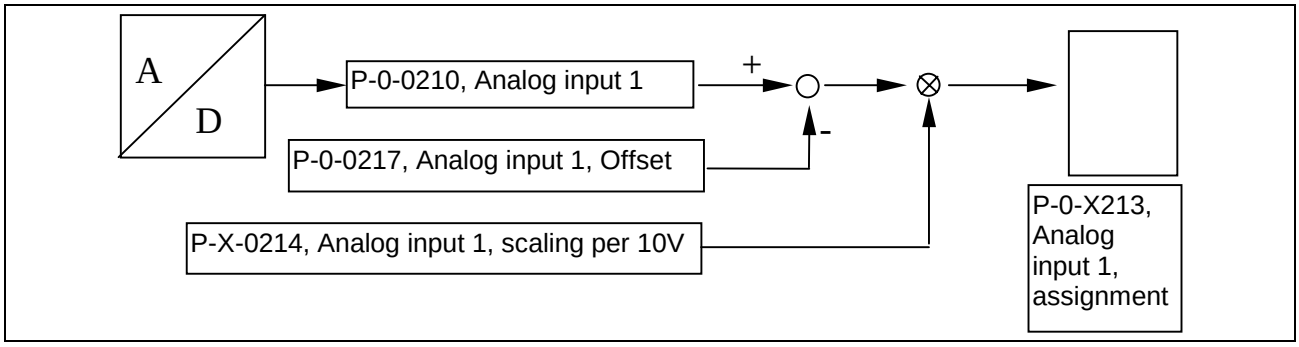


Fig. 9-6: Functional principle of assigning analog input 1 to a parameter

The converted voltage signals of both differential inputs are stored in parameter **P-0-0210, Analog input 1** respectively. An assignment of an analog input to a parameter is activated if in parameter **P-X-0213, Analog input 1, assignment** a value not equal to S-0-0000 has been parametrized. The contents of **P-0-0210, Analog input 1** minus the contents of **P-0-0217, Analog input 1, Offset** is scaled with the scaling factor set in **P-X-0214, Analog input 1, Scaling per 10V** and then copied into the parameter with the ID number set for the assignment in **P-X-0213, Analog input 1, Assignment**.

The **unit** of the parameter **P-X-0214, Analog input 1, Scaling per 10V** complies with the unit of the assigned parameter.

You can assign the analog channel 2 in the same way.

Only those parameters can be assigned that are listed in **P-0-0212, Analog inputs, IDN list of assignable parameters**.

Example: Assignment of analog input 1 to **S-0-0036, velocity command value** with 10 V equal to 1000 rpm

Parameter setting:

P-X-0213, analog input 1 = S-0-0036

P-X-0214, analog input 1, evaluation per 10V = 1000.0000 rpm

Note: If the parameter block transition function is used, then the analog input allocation for each parameter block must be set in S-0-0036!

Transition of Analog Input for C-Axis Mode

The C-axis mode necessitates a finer resolution of the velocity command value in comparison to the spindle mode. To do this it is possible to either switch to a different parameter block with a finer command value resolution or use the command value transition described here.

This can be used

- e.g., for C axis mode with smaller maximum speeds and thus finer speed stages in comparison to spindle mode
- the speed command value can reference the second ontrol output (usual with C axis)

C Axis Transition Resolution

If input EXT POS on DEA04.2M = 24 volts, then the speed command value is not directly taken from analog input 1 but rather parameter **P-0-1136, C-Axis velocity command value**.

Level at EXT POS	Active speed command value
0 Volt	via analog input 1 on S-0-0036
24 Volt	via analog input 2 on P-0-1136

Fig. 9-7: Select active speed command value

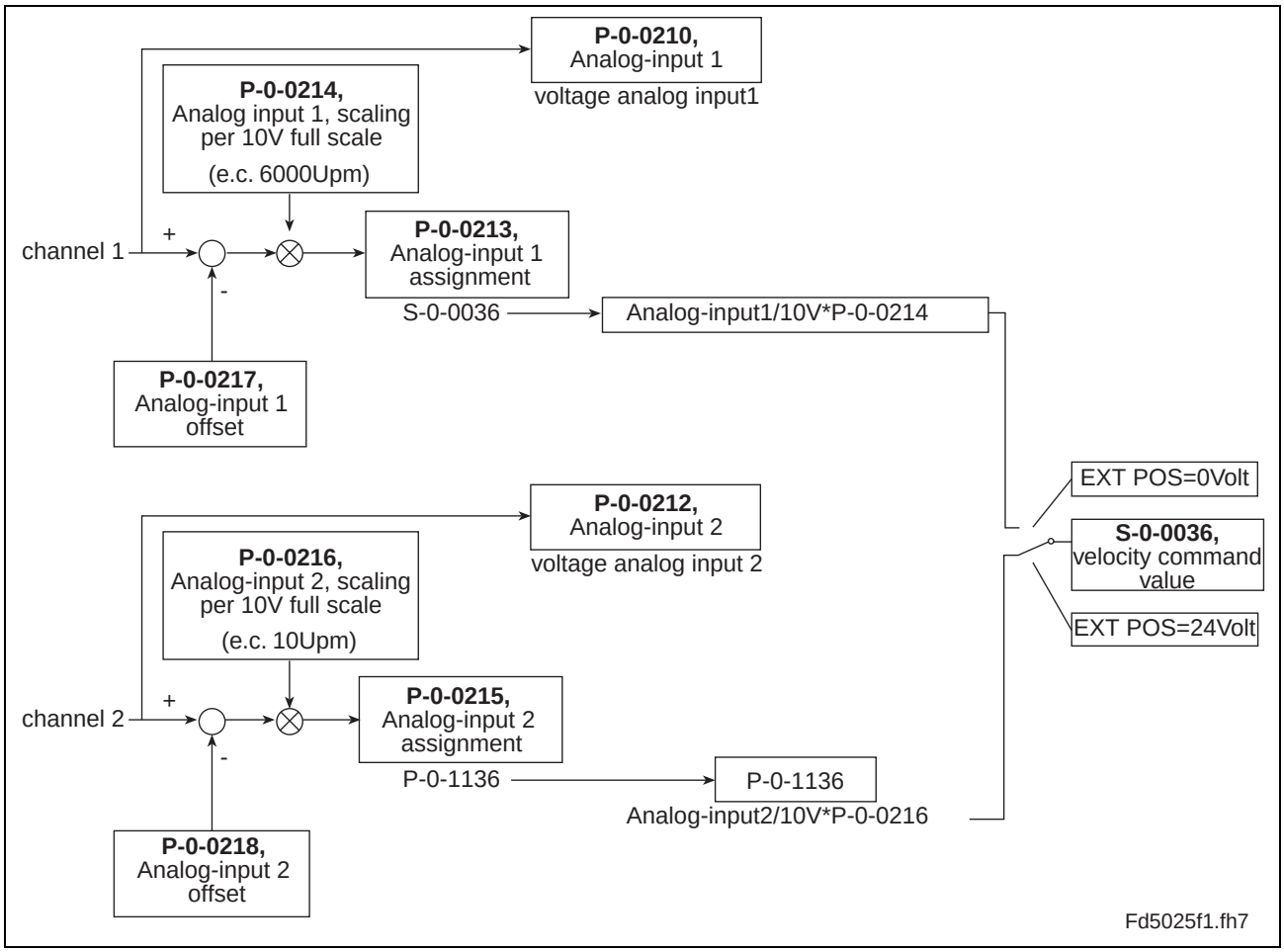


Fig. 9-8: Speed command value with EXT POS

Parametrizing the Value Transition

Attention: To ensure that the speed command value is in P-0-1136, the second analog input must be assigned to P-0-1136. To be able to allocate P-X-0215 on P-0-1136 the operating mode must be speed controlled otherwise the input generates error message "data not correct".

P-X-0215, Analog input 2, assignment

Data contents:	Comment:
e.g.: P-0-0215 = P-0-1136	Analog input 2 points to speed command EXT POS, in **S-0-0032, Primary mode of operation** speed control must be set.

Fig. 9-9: Data contents P-X-0215

P-X-0216, Analog input 2, scaling per 10V full scale

Data contents:	Comment:
e.g. 10 r.p.m	if for 10 volt input voltage 10 rpm speed are wanted

Fig. 9-10: Data contents P-X-0216

P-0-0218, Analog input 2, offset

Data contents:	Comment:
e.g. 10 mV	to compensate the offset error of analog input

Fig. 9-11: Data contents P-0-0218

The drive calculates the speed command value as follows:

$$P-0-1136[r.p.m]=\frac{(voltage\,analog\,input1)-(value\,in\,P-x-0218)}{10}*value\,in\,P-x-0215$$

Fig. 9-12: speed command value

Note: If EXT POS ais active, then analog input 2 is probed at 250 us.

With active EXT POS the speed command value in P-0-1136 is specified to the speed controller after the ramp and speed smoothing have taken place.

Analog Inputs - Connection

The inputs of the analog signals uses connector X75.

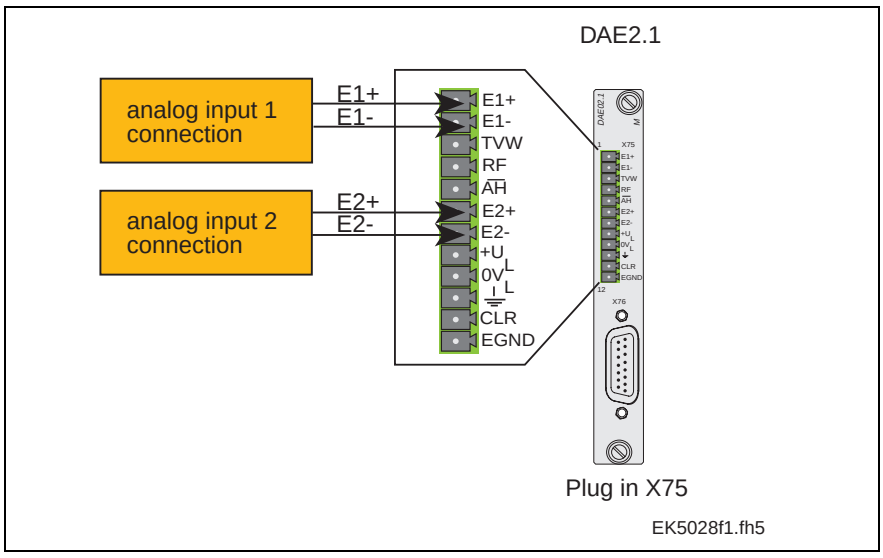


Fig. 9-13: Connection of analog inputs on DAE02.X

9.4 Digital Input/Output

The "digital input/output" feature allows for binary inputs and outputs through the DEA plug-in modules. DEAs 4, 5 and 6 offer 15 binary inputs and 16 binary outputs each. DEAs 8, 9 and 10 have 32 inputs and 24 outputs each.

The following DEA modules are supported:

- DEA 5.1
- DEA 6.1
- DEA 8.1
- DEA 9.1
- DEA 10.1

Note: **Plug-in module** DEA 4.x is used for other functions and is therefore not available for the digital inputs and outputs (also see section: "Command communications with parallel interface").

There may not be two interface cards of the same kind in a drive controller. Each drive controller can have a maximum of 96 inputs (3•32) and 72 outputs (3•24).

The following parameters are available for this feature:

- **P-0-0110, Parallel I/O Output 2**
- **P-0-0111, Parallel I/O Input 2**
- **P-0-0112, Parallel I/O Output 3**
- **P-0-0113, Parallel I/O Input 3**
- **P-0-0124, Assignment IDN -> DEA-Output**
- **P-0-0125, Assignment DEA-Input -> IDN**
- **P-0-0170, Parallel I/O Output 4**
- **P-0-0171, Parallel I/O Input 4**
- **P-0-0172, Parallel I/O Output 5**
- **P-0-0173, Parallel I/O Input 5**
- **P-0-0174, Parallel I/O Output 6**
- **P-0-0175, Parallel I/O Input 6**

It is also possible to assign a DEA output or DEA input to the current value of a parameter.

Digital I/O Functional Principle

The parameters "parallel input" and "parallel output" can be configured cyclically.

The binary in- and outputs are reflected in the parameters "Parallel input" and "Parallel output".

Two parameters are available for each DEA. The following assignment applies:

DEA Module:	Parameter for Input:	Parameter for Output:
DEA 5.1	P-0-0111	P-0-0110
DEA 6.1	P-0-0113	P-0-0112
DEA 8.1	P-0-0171	P-0-0170
DEA 9.1	P-0-0173	P-0-0172
DEA 10.1	P-0-0175	P-0-0174

Fig. 9-14: Digital Input/Output: Assigned Parameters

By reading the parameter "parallel input", you can obtain an image of the existing binary inputs of a DEA. By writing the parameter "parallel output", the binary outputs are updated.

The assignment of individual binary inputs and outputs to the bit numbers of the corresponding parameters for DEAs 5 and 6 are defined as follows:

Pin No. Input:	Bit No. in the Parameter:	Pin No. Output:
1	0 (LSB)	16
2	1	17
3	2	18
4	3	19
5	4	20
6	5	21
7	6	22
8	7	23
9	8	24
10	9	25
11	10	26
12	11	27
13	12	28
14	13	29
15	14	30
--	15 (MSB)	31

Fig. 9-15: Digital Input/Output: Bit Output Assignment - DEA 5, 6-Module

This applies for the DEAs 8 , 9 and 10:

Pin no. input:	Bin no. in parameter:	Pin no. output:
1	0 (LSB)	12
2	1	13
3	2	14
4	3	15
5	4	16
6	5	17
7	6	18
8	7	19
9	8	33
10	9	34
11	10	35
22	11	36
23	12	37
24	13	38
25	14	39
26	15	40
27	16	53
28	17	54
29	18	55
30	19	56
31	20	57
32	21	58
43	22	59
44	23	60
45	24	-
46	25	-
47	26	-
48	27	-
49	28	-
50	29	-
51	30	-
52	31	-

Fig. 9-16: Digital input/output: Assigning bit output - DEA 8, 9, 10 module

The parameter "parallel output" is copied to the DEA port every 250 µs. Likewise, the DEA port is copied to the "parallel input" every 250 µs.

Note: An external power supply must be connected to operate a DEA card.

It applies to DEA 5 and 6:

Pin 37: 24 V_{ext}

Pin 35 0 $V_{ext.}$

It applies to DEA 8, 9 and 10:

Pin 41, 61: 24 V_{ext}

Pin 21, 42, 62 0 $V_{ext.}$

If the power supply is missing, the **F233 External power supply error** will be generated.

Allocating ID Number - Parallel I/O

The current value of any desired parameter can be exported to the binary output of a DEA. Likewise, the binary inputs of a DEA can be mapped onto the current value of any desired parameter.

This feature is set with the parameters:

- **P-0-0124, IDN -> DEA-Output Assignment**
- **P-0-0125, DEA-Input -> IDN Assignment**

The parameters are structured as follows:

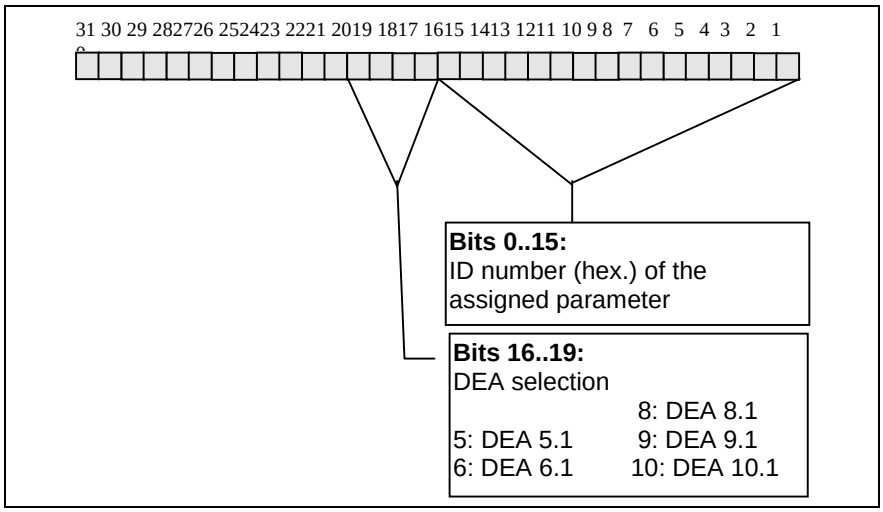


Fig. 9-17: Structure of Parameters P-0-0124 and P-0-0125

IDN -> DEA-Output Assignment

With the IDN -> DEA-Output Assignment, the current value of the assigned parameter is copied to the DEA output parameter; this is exported to the DEA outputs.

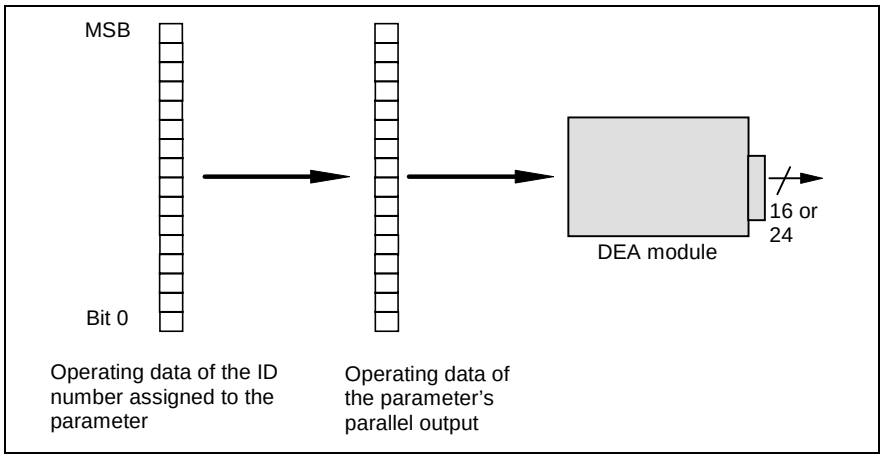


Fig. 9-18: Principle of assigning an ID number to a DEA output

If the data length of the current value for the assigned ID number is greater than 16 bits, then the upper bits of the current value will be truncated.

When the parameter **P-0-0124, Assignment IDN -> DEA-Output** is written, then the following will be checked:

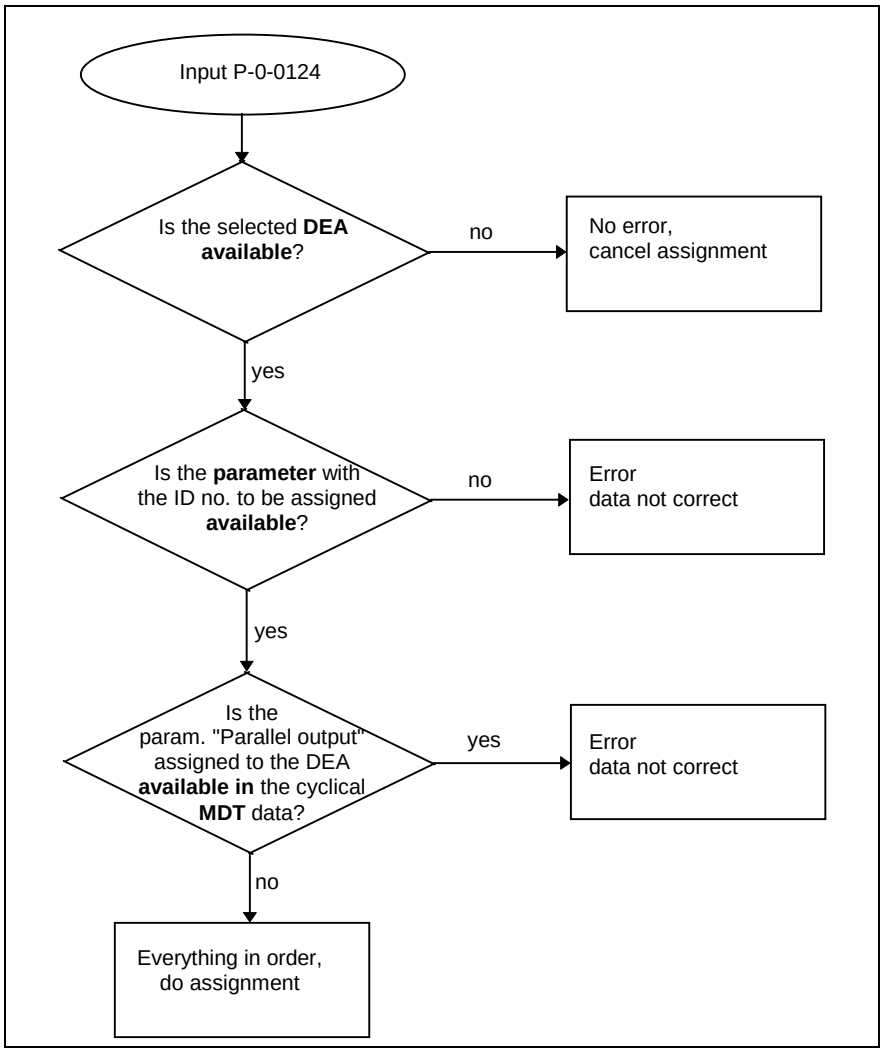

Input P-0-0124
Is the selected **DEA available**?
no
No error, cancel assignment
yes
Is the **parameter** with the ID no. to be assigned **available**?
no
Error data not correct
yes
Is the param. "Parallel output" assigned to the DEA **available in** the cyclical **MDT** data?
yes
Error data not correct
no
Everything in order, do assignment

Fig. 9-19: Checks when inputting parameter P-0-0124, assigning ID number -> DEA- output

DEA-Input -> IDN Assignment

During the "DEA Input -> ID Number" assignment, all binary inputs of the DEA are mapped onto the "DEA Input" parameter; the parameter is then copied to the current value of the assigned parameter.

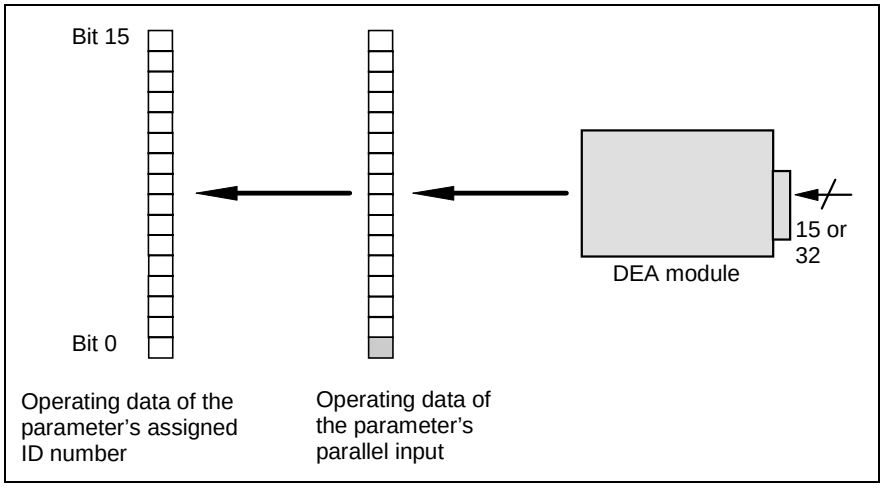

Bit 15
Bit 0
15 or 32
DEA module
Operating data of the parameter's assigned ID number
Operating data of the parameter's parallel input

Fig. 9-20: Diagram for DEA-Input -> IDN Assignment

If data length of the current value for the assigned ID number exceeds 16 bits, then the upper bits of the operating data in DEAs 5 and 6 are cut off (truncated).

If the parameter **P-0-0125, Assignment DEA-Input -> IDN** is written, then the following will be checked:

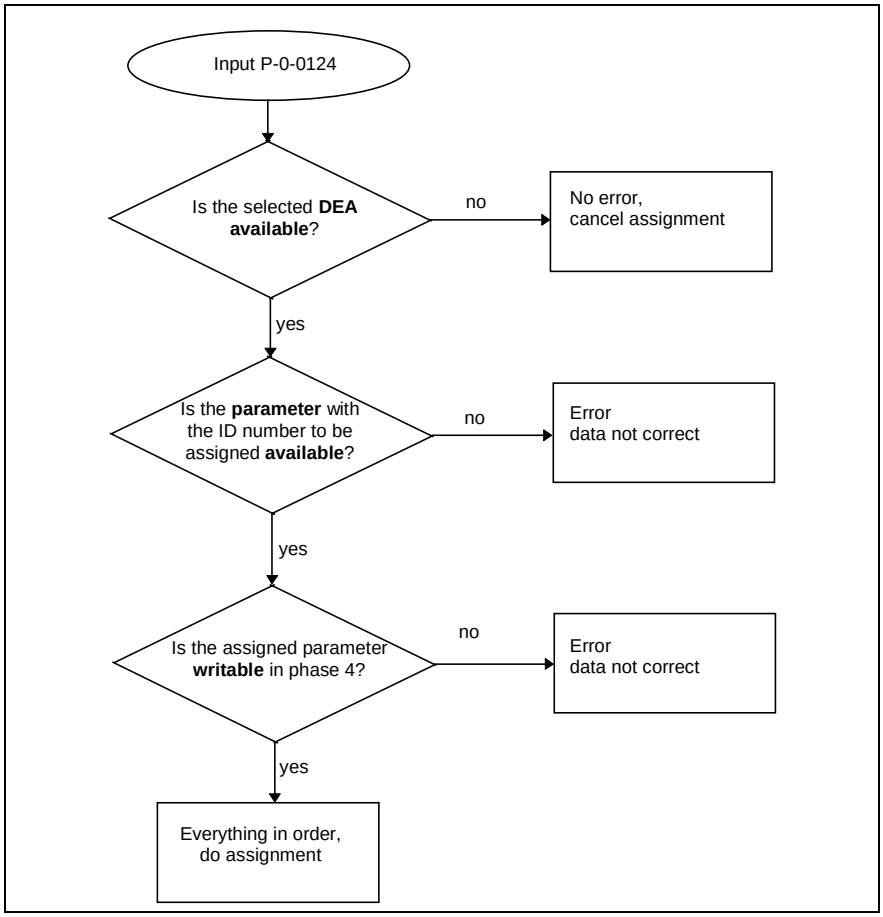


Fig. 9-21: Checks during input of the Parameter P-0-0125, Assignment DEA-Input -> IDN

9.5 Oscilloscope Feature

The oscilloscope feature is used to diagram internal and external signals and output variables. Its function is comparable to a 2-channel oscilloscope. The following parameters are available to set the oscilloscope feature:

- **P-0-0021, List of Scope Data 1** (always 4-byte data)
- **P-0-0022, List of Scope Data 2** (always 4-byte data)
- **P-0-0023, Signal Select Scope Channel 1**
- **P-0-0024, Signal Select Scope Channel 2**
- **P-0-0025, Trigger Source**
- **P-0-0026, Trigger Signal Selection**
- **P-0-0027, Trigger Level for Position Data**
- **P-0-0028, Trigger Level for Velocity Data**
- **P-0-0029, Trigger Level for Torque/Force Data**
- **P-0-0030, Trigger Edge**
- **P-0-0031, Timebase**
- **P-0-0032, Size of Memory**
- **P-0-0033, Number of Samples after Trigger**
- **P-0-0035, Delay from Trigger to Start** (cannot be written)
- **P-0-0036, Trigger Control Word**
- **P-0-0037, Trigger Status Word**
- **P-0-0145, Expanded Trigger Level**
- **P-0-0146, Expanded Trigger Address**
- **P-0-0147, Expanded Signal K1 Address**
- **P-0-0148, Expanded Signal K2 Address**
- **P-0-0149, List of selectable signals for oscilloscope function**
- **P-0-0150, Number of valid Samples for Oscilloscope Function**

Main Functions of the Oscilloscope Feature

The oscilloscope feature can be activated with the parameter **P-0-0036, Trigger Control Word** by setting bit 2. From then on, all data will be recorded that was selected through the parameters **P-0-0023, Signal Selection Channel 1** and **P-0-0024 Signal Selection Channel 2**. The selection will be defined with numbers that are assigned to various signals.

The triggering is activated by setting the bit 1 in the "Trigger Control Word" parameter. The trigger conditions can be set with the parameters **P-0-0025, Trigger Source, P-0-0026, Trigger Signal Selection** and **P-0-0030 Trigger Edge**. The signal amplitude that releases the trigger can be set with the parameters **P-0-0027 - P-0-0029 Trigger Level**.

If a trigger event is recognized, then the number of values in the parameter **P-0-0033 Number of Samples after Trigger** will be recorded, and the function will end. Parameters **P-0-0031 Timebase** and **P-0-0032 Size of Memory** can define the recording duration and the time intervals for the measurement samples.

The sampled values are stored in the **P-0-0021 and P-0-0022 List of scope data** and can be read by the control.

Parameterizing the Oscilloscope Feature

Oscilloscope feature with defined recording signals

Preset signals and state variables can be selected through the **P-0-0023 and P-0-0024 Signal Selection** parameters. The selection can be made by entering the signal number (hex format) in the corresponding signal selection parameter. The selected signal number defines the unit of data stored in the list of scope data. The following signals are predefined with numbers.

Number:	Signal selection:	Unit of the probe value list:
0x00	Channel not activated	--
0x01	Actual position feedback value dependent on operating mode S-0-0051 or S-0-0053	dependent on position scaling
0x02	Velocity feedback value Parameter (S-0-0040)	velocity scaling dependent
0x03	Velocity control deviation (S-0-0347)	velocity scaling dependent
0x04	Following error Parameter (S-0-0189)	dependent on position scaling
0x05	Torque/force command value Parameter S-0-0080	Percent
0x06	Position feedback 1 value S-0-0051	dependent on position scaling
0x07	Position feedback 2 value S-0-0053	dependent on position scaling
0x08	Position command value S-0-0047	dependent on position scaling

Fig. 9-22: Selection of predefined signals

Note: Parameter **P-0-0149, List of selectable signals for oscilloscope function** was introduced so that the control can detect the number of preset numbers. This parameter is constructed in terms of a list parameter and transmits the ID numbers of the possible signals.

Expanded Oscilloscope Recording Function

In addition to the oscilloscope feature with preset signals, the drive also allows for recording of any desired internal signals. Use of this feature is meaningful only with information about the structure of the internal data memory; therefore, this feature can be used effectively only by the corresponding developer. The feature can be activated with the **Signal Selection P-0-0023 & P-0-0024** parameters by setting bit 12 = "1". The format for the data to be saved can be defined with bit 13.

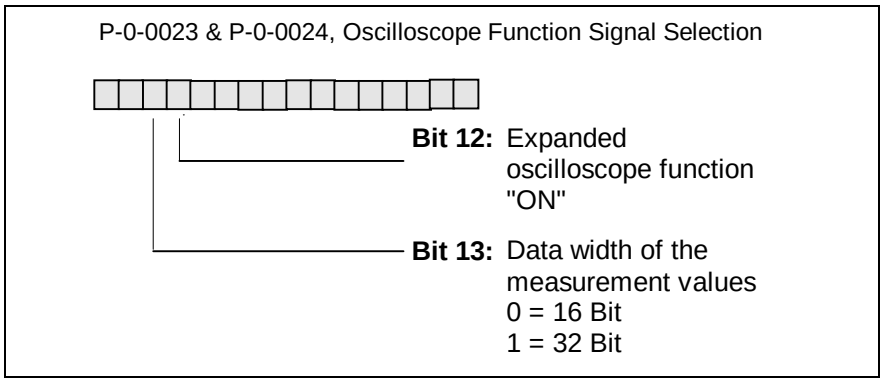

P-0-0023 & P-0-0024, Oscilloscope Function Signal Selection
Bit 12: Expanded oscilloscope function "ON"
Bit 13: Data width of the measurement values
0 = 16 Bit
1 = 32 Bit

Fig. 9-23: Structure of Parameters P-0-0023 and P-0-0024

If the expanded signal selection is parameterized, then the desired signal address can be defined in parameters **P-0-0147, Expanded signal K1 address** and **P-0-0148, Expanded signal K2 address**. During the recording process, the contents of the selected addresses are saved in the lists of scope data.

Note: If a 16-bit data width is selected, then the signal data will be stored as sign-extended 32-bit values.

Oscilloscope Feature Trigger Source

The **P-0-0025 Trigger Source** parameter makes it possible for the user to choose between two trigger types.

External trigger (P-0-0025 = 0x01)

The trigger is activated by the control through bit 0 in the **Trigger Control Word**. This makes it possible to transmit a trigger event to several drives. This parameterization supports parameter P-0-0035, which is needed to visualize the recording data.

Internal trigger (P-0-0025 = 0x02)

Triggering occurs through the monitoring of the parameterized trigger signal. If the selected edge is recognized, then the trigger will be released. The "Delay from Trigger to Start" parameter will be set to zero.

Selection of Trigger Edges

Various trigger edges can be selected with the parameter **P-0-0030 Trigger Edge**. The following options are available:

Number:	Trigger Edge:
0x01	Triggering on the positive edge of the trigger signal
0x02	Triggering on the negative edge of the trigger signal
0x03	Triggering on both the positive and negative edge of the trigger signal
0x04	Triggering when the trigger signal equals the trigger level

Fig. 9-24: Trigger edge selection

Selection of Fixed Trigger Signals

The parameter **P-0-0026 Trigger Signal Selection** determines the signal that is monitored for the parameterized edge reversal. Just as for the signal selection, there are drive-internal fixed trigger signals for the trigger signal selection. These are activated by entering the corresponding number.

The following signal numbers are possible:

Trigger signal number:	Trigger signal:	Associated trigger edge:
0x00	no trigger signal	not defined
0x01	Actual **position** feedback according to active operating mode	Position data (P-0-0027)
0x02	**Velocity** feedback value Parameter S-0-0040	Velocity data (P-0-0028)
0x03	**Velocity deviation** Parameter S-0-0347	Velocity data (P-0-0028)
0x04	**Following error** Parameter S-0-0189	Position data (P-0-0027)
0x05	**Torque command** value Parameter S-0-0080	Torque data (P-0-0029)

Fig. 9-25: Selection of fixed trigger signals

Selection of Expanded Trigger Signals

In addition to a trigger signal selection with preset signals, the drive also allows for triggering on any desired internal signal. Use of this feature is meaningful only with information about the structure of the internal data memory; therefore, this feature can be used effectively only by the corresponding developer. This feature can be activated with the parameter **P-0-0026 Trigger Signal Selection** by setting bit 12 to 1.

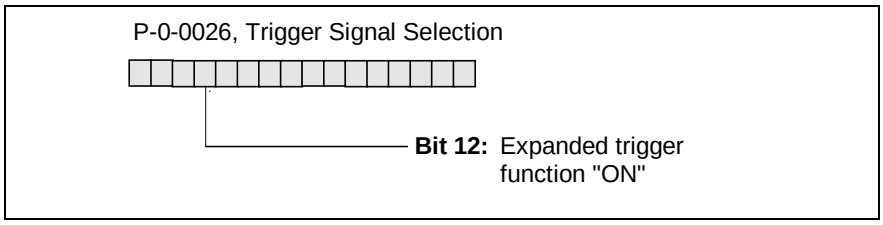


Fig. 9-26: Structure of parameter P-0-0026

If the expanded trigger feature is activated, then the trigger signal address must be defined via the parameter **P-0-00146 Expanded Trigger Address**. The associated trigger level is entered in the parameter **P-0-0145 Expanded Trigger Level**. This parameter is defined as follows:

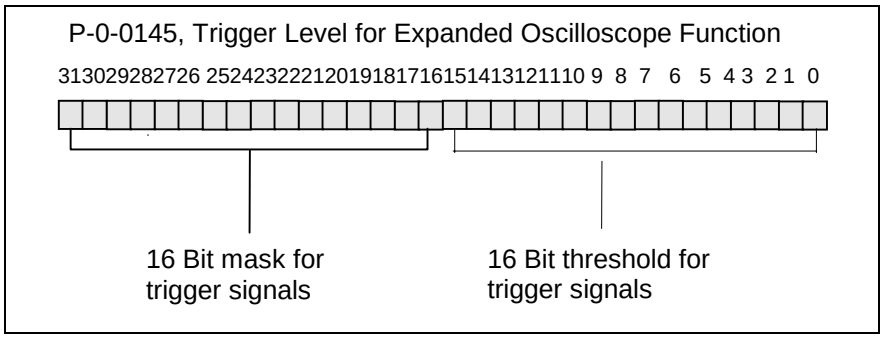

P-0-0145, Trigger Level for Expanded Oscilloscope Function
313029282726 25242322212019181716151413121110 9 8 7 6 5 4 3 2 1 0
16 Bit mask for trigger signals
16 Bit threshold for trigger signals

Fig. 9-27: Structure of parameter P-0-0145

The 16-bit value of the trigger edge is monitored and the trigger signal will be ANDed with the trigger signal screen mask.

Setting the Time Resolution and the Memory Depth

The recording ranges for the oscilloscope feature can be defined with parameters **P-0-0031 Timebase** and **P-0-0032 Size of Memory**. The maximum memory depth is 512 samples. If you need fewer samples, you can change the value in the memory size parameter.

The time resolution can be set from 250 µs to 100 ms in steps of 250 µs. This determines the time intervals in which the samples are recorded. The minimum recording duration is 128 ms; the maximum recording duration is 51.2 s.

In general:

$$\text{Recording duration} = \text{Time resolution} \times \text{Size of Memory} \left[\mu s\right]$$

Fig. 9-28: Determining of the recording duration

Setting the Trigger Delays

By setting the parameter **P-0-0033 Number of Samples after Trigger**, it is possible to record probe values before the trigger event occurs (trigger delay function of an oscilloscope). The setting occurs in units of the parameterized time resolution. The input value determines the number of probe values still recorded after a trigger event. By entering 0 • [time resolution], only data available before a trigger event will be recorded. If the value of the P-0-0032 Size of Memory parameter is entered, then only the probe values occurring after the trigger event will be recorded.

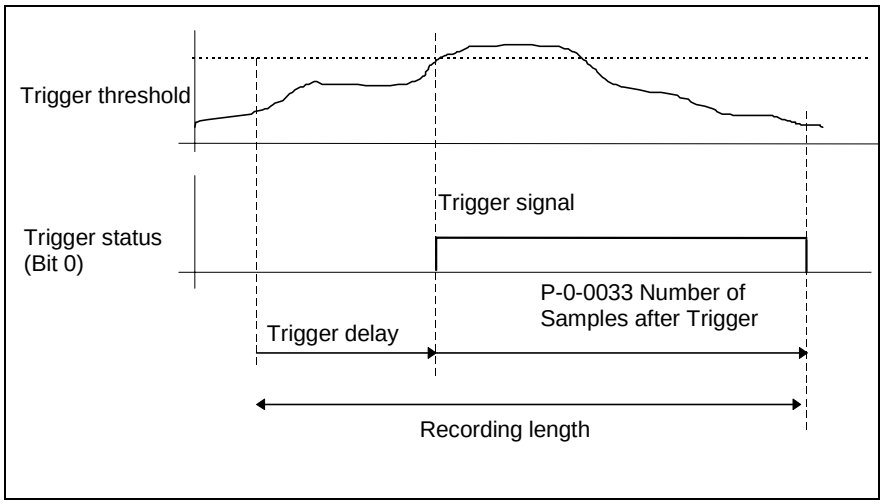


Fig. 9-29: Trigger delay - Number of samples after trigger

Activating the Oscilloscope Feature

The oscilloscope feature can be activated with the parameter **P-0-0036 Trigger Control Word**. The parameter is defined as follows:

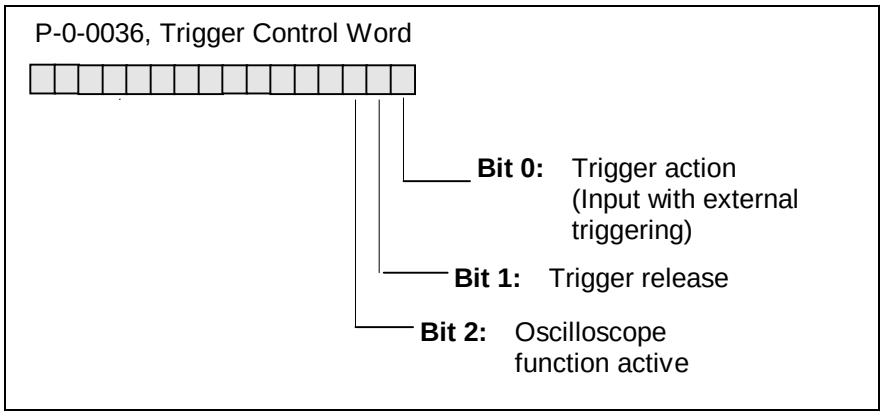

P-0-0036, Trigger Control Word
Bit 0: Trigger action (Input with external triggering)
Bit 1: Trigger release
Bit 2: Oscilloscope function active

Fig. 9-30: Structure of Parameter P-0-0036

The oscilloscope feature is activated by writing "1" into bit 2; i.e., the internal probe value memory is continually written with the selected measurement signals. If bit 1 is set, then the trigger monitor is activated, and the oscilloscope feature waits for the selected edge to occur. If a valid edge is recognized, then the probe value memory will be completed as set in parameter P-0-0033, and the oscilloscope feature will be deactivated by resetting bits 1 & 2 in the trigger control word.

Oscilloscope Feature With External Trigger and Internal Trigger Condition

If triggering is selected in parameter **P-0-0025 Trigger Source** with the control bit of the trigger control word, then the trigger will be initiated with the 0→1 (rising) edge of bit 0 in the trigger control word.

With this drive, it is also possible to monitor a trigger signal for the trigger condition. If the trigger condition is recognized, then bit 0 will be set in the trigger status, but it will not trigger. In this way, it is possible to signal the trigger event for several drives simultaneously using the real-time status and control bits via the control and to release the trigger.

Since there is a delay between the recognition of the trigger event and the enabling of this trigger, the delay is measured by the drive controller and stored in the parameter **P-0-0035, Delay from Trigger to Start**. A time-correct display of the signal can be guaranteed by using this parameter for the visualization of the probe values.

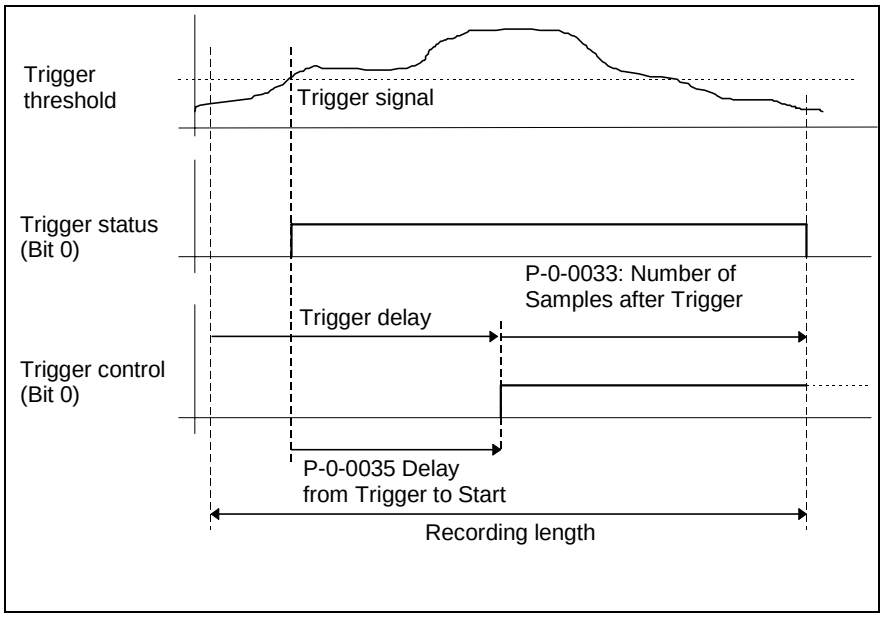


Fig. 9-31: Delay from trigger to start

Status Messages for the Oscilloscope Feature

Information about the status of the oscilloscope feature is shared with the control by means of parameter **P-0-0037, Trigger Status Word**.

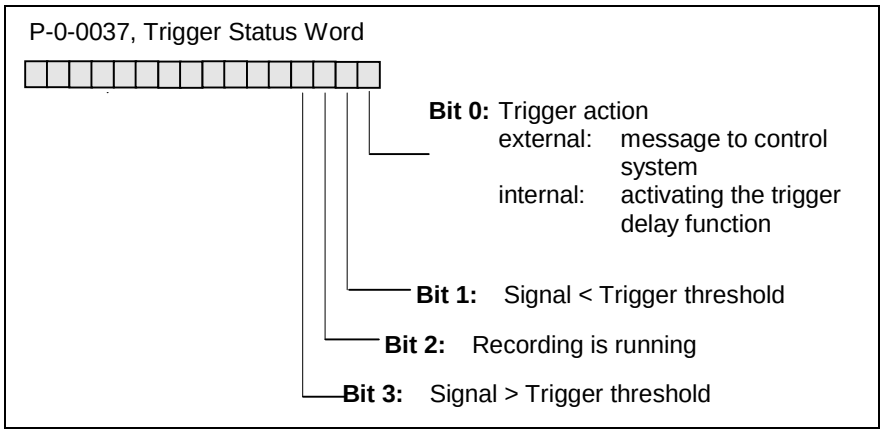


Fig. 9-32: Structure of Parameter P-0-0037

Number of Valid Probe Values

As soon as bit 2 is set by the **P-0-0036, Trigger Control Word**, the drive starts to record probe values.

If the trigger event is recognized after the bit is set, the oscilloscope feature records the number of samples after the trigger event and then stops recording.

The total probe value memory for the current measurement will not always be written, dependent on the memory size setting, the time resolution, the number of samples after trigger and the time when the trigger event occurs.

This means that the memory can contain samples which are not valid for the measurement.

The parameter **P-0-0150, Number of valid Samples** indicates the number of valid samples for the current recording.

9.6 Command - detect marker position

The command "Determine marker position" is used to check the correct detection of the reference markers of an incremental measuring system. This does not include an evaluation of the zero switch.

The following parameters are provided for this function:

- **S-0-0173, Marker position A**
- **P-0-0014, D500 Command determine marker position**

Functional principle of command detect marker position

Once the command **P-0-0014, D500 detect marker position** is activated, the following is done:

Only possible with incremental measuring systems

- The diagnosis **D500 detect marker position command** is generated.
- Check whether the encoder selected by bit 3 of **S-0-0147, Homing parameter** is an incremental measuring system. Incremental measuring systems are those connected via one of the encoder interfaces listed below. If this is not the case, then the command error message **D501 Incremental encoder required** is generated. The command cannot be executed any further.
- If an incremental measuring system is selected, then the detection of a reference marker is activated, and the drive waits for the next reference marker.
- If a reference marker is detected, then its position feedback value is stored in parameter **S-0-0173, marker position A.** This command is now signalled as completed.

Note: No command values are generated. The mode active at command start remains unchanged. To override the reference marker, the control must generate command values, e.g., by jogging.

Possible encoder interfaces of incremental measuring systems:

Encoder interface	Number
DLF01.1	2
DZF02.1	3
DEF011	5
DEF02.1	6
DZF03.1	9

Fig. 9-33: Possible encoder interfaces of incremental measuring systems

Additional uses of parameter "S-0-0173, Marker position A"

In parameter **S-0-0173, Marker position A**, the position of the reference marker is also stored during the command **S-0-0148, C600 command drive-controlled homing**. This relates, however, to the "old" coordinate system (before the coordinate system was switched while performing a homing function).

9.7 Command Parking Axis

The command "Parking Axis" supports the operational decoupling of an axis. This may, for example, be necessary if an axis is temporarily brought to a standstill. The start of the command switches off all monitoring functions of the measuring system and the control loops.

The following parameter is available for this function:

- **S-0-0139, D700 Command parking axis**

The functional principle of the command parking axis

Command can only be executed in parameter mode

The command can only be started in parameter mode (communications phases 2 or 3). Once **S-0-0139, D700 command parking axis** is started, the:

- The measuring system monitors ,
- the control loop monitors and
- the temperature monitors

are deactivated.

The measuring system initializations are not executed in command **S-0-0128, C200 communications phase 4 transition check**. "**PA**" appears at the 7-segment display. The drive no longer accepts the drive enable signal.

All active commands in the drive are cancelled when switching the communications phases back. If this command was activated, followed by a progression into communications phase 4 (operating mode), then there is no need to cancel the command, as the cancelling is only possible in communications phases 2 or 3, and any phase regression will also inevitably cancel all commands.

9.8 Encoder Emulation

It is possible, with the help of encoder emulation to generate positions in the usual formats

- **TTL format** with incremental encoder emulation
- **SSI format** with absolute encoder emulation.

This makes it possible for an external control to close the position control loop.

Incremental encoder emulation

Incremental encoder emulation is the reproduction of a real incremental encoder by a driver controller.

With the help of an incremental encoder signal signals are relayed via a higher-ranking numeric control (NC) entailing information about the motional speed of the motor mounted to the controller. By integrating this signal, the control generates information for itself about positions. It is thus able to close a higher-ranking position control loop.

Absolute encoder emulation

"Absolute encoder emulation" means that the drive controller has the option of emulating a real absolute encoder in **SSI data format**. The drive controller thus offers the possibility to transmit the position in SSI data format to the connected control (NC). The control is thus in a position to close the position control loop.

Pertinent Parameters

- **P-0-4020, Encoder emulation type**
- **P-0-0502, Encoder emulation, resolution**
- **P-0-0012, C300 Command 'Set absolute measurement'**

For **Incremental encoder emulation,** parameter

- **P-0-0503, Marker pulse offset**

is used.

For **Absolute encoder emulation,** parameter

- **S-0-0052, Reference distance 1**

is used.

Activating Encoder Emulation

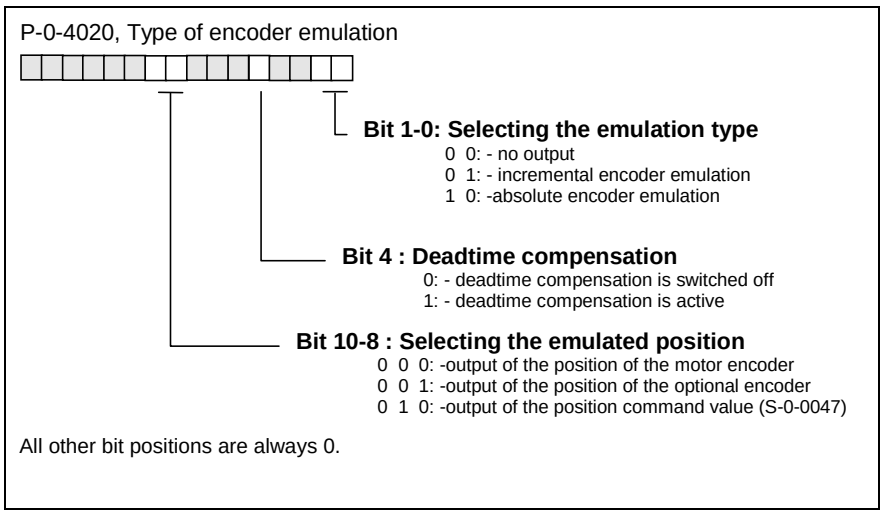

P-0-4020, Type of encoder emulation
Bit 1-0: Selecting the emulation type
0 0: - no output
0 1: - incremental encoder emulation
1 0: -absolute encoder emulation
Bit 4 : Deadtime compensation
0: - deadtime compensation is switched off
1: - deadtime compensation is active
Bit 10-8 : Selecting the emulated position
0 0 0: -output of the position of the motor encoder
0 0 1: -output of the position of the optional encoder
0 1 0: -output of the position command value (S-0-0047)
All other bit positions are always 0.

Fig. 9-34: Parameter encoder emulation type P-0-4020

Functional principle: Incremental Encoder Emulation

Number of lines

The **number of lines** of the emulated incremental encoder is fixed in parameter **P-0-0502, Encoder emulation, resolution**:

- **1 bis 262144 (=2^18) number of lines / revolution**

Note: If a motor with resolver feedback is mounted, then the emulator generates as many zero pulses as the resolver has pairs of poles. It must therefore be noted that the input for **P-0-0502**, **Encoder emulation, resolution** must be divisible by the number of resolver pole pairs without a remainder, otherwise the "zero pulse will run away".

Unit

The parameter unit depends on the motor type, i.e.,

- rotary motors: lines / revolution
- linear motors: linkes / mm or lines / inch

If the unit of **P-0-0502, Encoder emulation, resolution** "lines/revolution", then the zero pulse can be shifted within a revolution in a clockwise direction with the use of P-0-0503. The unit of P-0-0503 is then degrees and the input range equals 0..359.9999 degrees.

Note: The incremental encoder emulates only encoder-related position regardless of what has been defined in **S-0-0076, Scaling mode for position data.**

Position of the Zero Pulse as Relates to Motor Position

Absolute encoder

With motor encoders that achieve an absolute and clear position within one motor revolutions after initialization, or within one electrical revolution with resolvers, the zero pulse is always generated at the same motor position each time the unit is switched on.

Relative encoder

Relative encoders do not have a clear position allocation after powering up. This is why it is necessary to home. Homing uses the inremental encoder emulator zero pulse.

With relative encoders, e.g., sine, gearwheel encoders, the following occurs automatically with each progression of phases 2 to 4 (in other words after each powering up of the drive controller):

- The detection of the motor encoder internal reference point is activated.
- The zero pulse output of the incremental encoder emulator is locked.
- The increment output is activated.

It is assumed that the motor can now be run via the position control loop by the control (homing, going to zero or referencing).

Referencing

The drive can also conduct drive-guided referencing if the control permits it.

As soon as the motor encoder internal reference point is detected, the following is conducted:

- general release of zero pulse output
- immediate output of a zero pulse by the emulator
- initialization of zero pulse so that it is always output at this absolute motor position.

Limiting Incremental Encoder Emulation

In contrast to the conventional incremental encoder with which the pulseoutput frequency is practically infinitely change in very fine increments (i.e., the pulse flanks are allocated to a fix position), emulated incremental encoder signals are subject to some restrictions. These are primarily the result of how the digital process work and the drive controller.

Maximum output frequency

The maximum pulse frequency is for devices 1024 kHz. If this frequency is exceeded, then pulses could go missing. The non-fatal error **F253 Incr. encoder emulator: pulse frequency too high** is generated. An emulated positioning offset then occurs in contrast to the real position.

$$l_{max} = \frac{f_{max} * 60}{n_{max}}$$

l_{max}: maximum line number
n_{max}: allowable maximum speed in 1/min

Fig. 9-35: Computing the maximum number of lines

Compensation of delay (deadtime) between real and emulated positions

Between position measurement and pulse output, there is a dead time (delay) of abt. 500µs devices. If in the parameter **P-0-4020, Encoder emulation type** bit 4 is set to 1, this time is compensated in the drive.

Compensation is a precontrol which only works precisely at constant speed. Any processes with changeable speed inevitable lead to an "unquiet" run of the position output. It is therefore necessary to check with each application whether the dead time compensation is advantageous or not.

Diagnostic Messages with Incremental Encoder Emulation

The following diagnoses are generated with incremental encoder emulation:

- **F253 Incr. encoder emulator: pulse frequency too high**

Cause: The output frequency at the chosen number of lines exceeds the value of 1024 kHz.

Remedy:
- Decrease input for **P-0-0502, Encoder emulation, resolution**
- Drop travel speed

- **F254 Incr. encoder emulator: hardware fault**

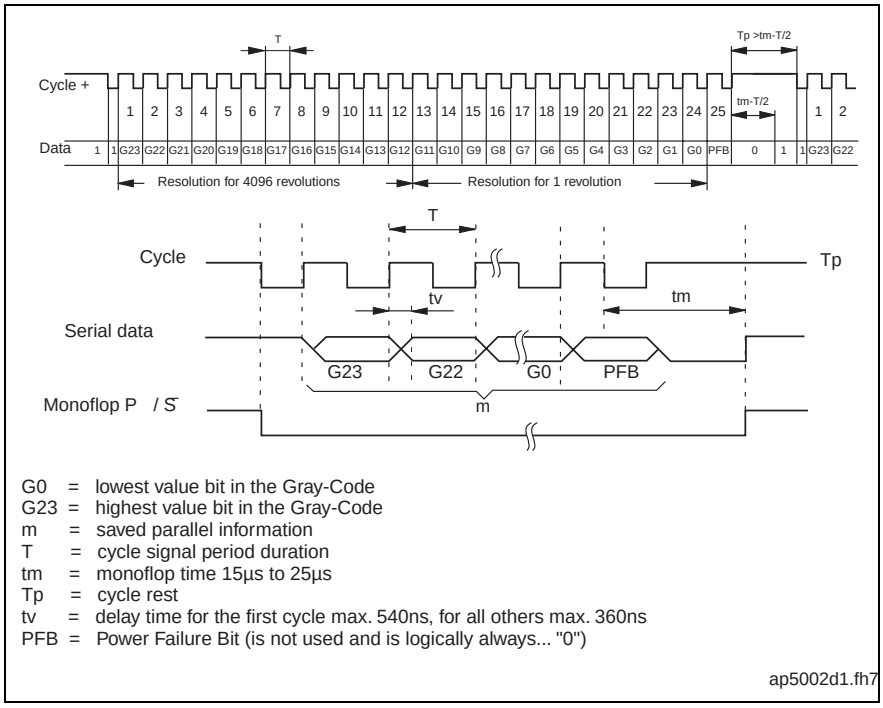
Cause: The output of all lines are monitored in interval and was faulty in this case so that a positioning offset occurred. The error occurs only with extremely long interrupt running times.

Remedy:
- All software options that are not absolute necessary are switched off, e.g., the procesing of the second analog input, signal output via both analog outputs and so on.

Functional Principle: Absolute Encoder Emulation

SSI Format

The following illustrates the format of SSI data transmission.


T
Tp >tm-T/2
Cycle +
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
tm-T/2
1 2
Data
1 1 G23 G22 G21 G20 G19 G18 G17 G16 G15 G14 G13 G12 G11 G10 G9 G8 G7 G6 G5 G4 G3 G2 G1 G0 PFB 0 1 1 G23 G22
Resolution for 4096 revolutions
Resolution for 1 revolution
T
Cycle
Tp
tv
tm
Serial data
G23
G22
G0
PFB
Monoflop P / S
m

G0 = lowest value bit in the Gray-Code
G23 = highest value bit in the Gray-Code
m = saved parallel information
T = cycle signal period duration
tm = monoflop time 15µs to 25µs
Tp = cycle rest
tv = delay time for the first cycle max. 540ns, for all others max. 360ns
PFB = Power Failure Bit (is not used and is logically always... "0")

ap5002d1.fh7

Fig. 9-36: SSI-Format as pulse diagram

Note: The Power Failure Bit is not evaluated in the drive!

Resolution with Absolute Encoder Emulation

The increments per mechanical revolutions or per length unit are entered in parameter **P-0-0502**, **Encoder emulation, resolution**.

Note: The **unit** of the parameter is **switched** when selecting SSI emulation via parameter **P-0-4020, Encoder emulation type.**

The input range and unit depends on **S-0-0076, Position data scaling type.** The following combinations are possible:

- 12 .. 24 bit / revolution
- 4 .. 24 bit / mm
- 8 .. 24 bit / inch.

The output direction is set in parameter **S-0-0055 Position polarities**.

Referencing with Absolute Encoder Emulation

Using parameter **P-0-0012, C300 Command 'Set absolute measurement'** it is posible to reference the absolute position output by the absolute encoder emulator .

With set absolute dimension, the value of parameter S-0-0052 Reference distance 1 is set.

Position jumps at the Display Limits of Absolute Encoder Emulation

Using SSI emulation, it is possible to illustrate 4096 revolutions absolutely. If when using SSI emulation the display limit has been reached, then small actual position fluctuations lead to large **jumps in the emulated SSI position**.

This is, e.g., the case with position 0 and 4096 revolutions.

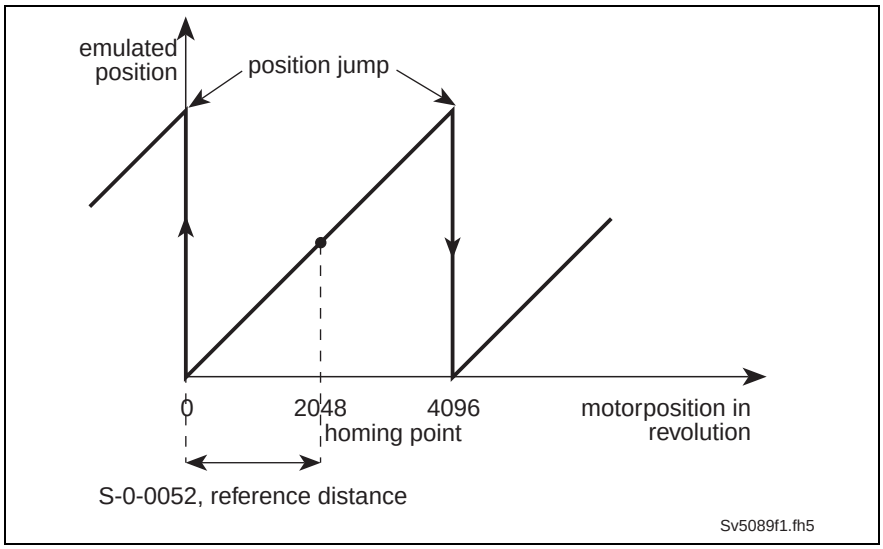


Fig. 9-37: SSI display limits

To avoid this, then use commando **P-0-0012, C300 Command 'Set absolute measurement'** to shift the SSI position value.

It is recommended to move the position into the center of the SSI display range by means of the reference actual position value 1. This offers the option of running 2048 revolutions to the left and right.

9.9 Spindle Positioning

Spindle positioning in milling and drilling spindles were used

- to prepare the change of the workpiece while the spindle remained a defined position.

Spindle positioning in lathe main spindles support the orientation of the spindle

- when changing the workpiece, if necessary,
- the putting into place of balancing drill holes in workpieces that are to be balanced,
- to index the workpiece for further machining.

In rotary tables, spindle positioning

- the relaying of the rotary table to bring the workpieces in the machining stations into a defined machining position.

A command from the control makes the drive move the spindle in terms of the zero position of the spindle. The command position can be set by means of parameters. It can be set as either an absolute or a relative position.

The spindle positioning command can, for example, position the spindle in velocity control mode in a position-controlled manner without having to switch from velocity to position control mode. The velocity command set by the control is ignored for the duration of the command.

Pertinent Parameters

The following parameters are needed for setting up spindle positioning and to execute the command:

- **S-0-0152, C900 Position spindle command**
- **S-0-0153, Spindle angle position**
- **S-X-0154, Spindle position parameter**
- **S-0-0180, Spindle relative offset**
- **S-X-0222, Spindle positioning speed**
- **S-X-0057, Position window**
- **P-0-0312, Spindle position 1**
- **P-0-0313, Spindle position 2**
- **P-0-0314, Spindle position 3**
- **P-0-0315, Spindle position 4**
- **P-0-0322, Spindle relative offset 1**
- **P-0-0323, Spindle relative offset 2**
- **P-0-0324, Spindle relative offset 3**
- **P-0-0325, Spindle relative offset 4**

Functional Principle of Command Spindle Positioning

The command spindle positioning entails two different cases:

Spindle positioning with drive already referenced

The turning spindle brakes at the velocity command value ramp set (or with active command value smoothing) to the spindle positioning velocity and runs to the specified command position with that absolute positioning which has been set.

The drive holds the position in a position controlled manner until the command is completed or a new command position is set.

Once the command is completed, the drive runs with the current velocity or torque command value.

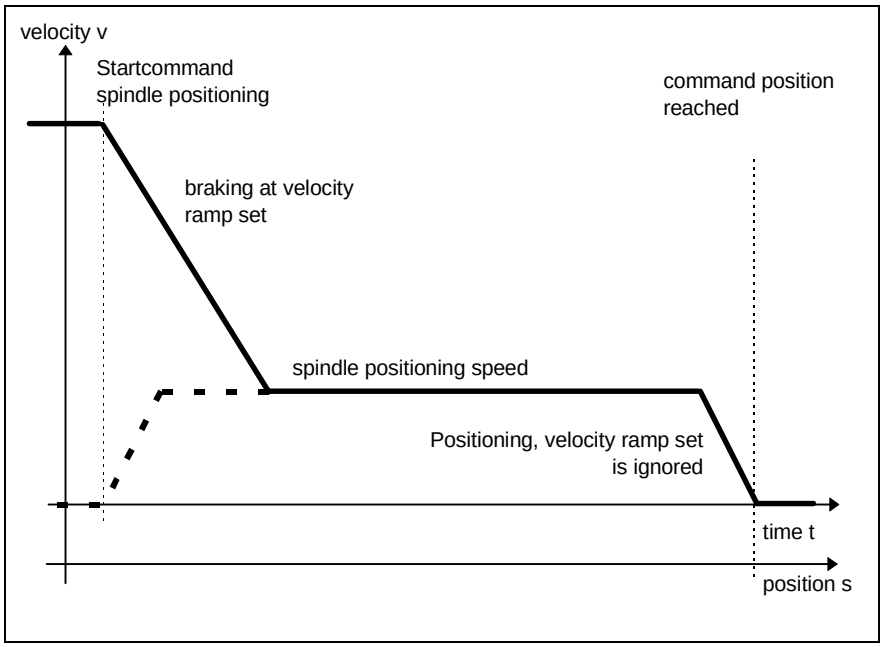


Fig. 9.38: Velocity/time diagram of spindle positioning

Various parameters are used to adapt spindle positioning to the demands of the machine:

- positioning command value, absolute or relative,
- spindle positioning speed,
- positioning rotational direction,
- selection of positioning process

If spindle speed is smaller or equal to positioning speed, then the drive goes into position control. The values set in parameters **S-X-0138, Bipolar acceleration limit value** and **S-0-0349, Jerk limit bipolar** are used for positioning acceleration and jerk.

Spindle positioning with non-referenced drive

If the drive is not in reference (**S-0-0403, Position feedback value status** bit 0 = 0) then referencing is automatically started prior to positioning.

The drive first brakes to referencing speed. At this speed, it searches for the reference pulse. As soon as it is located, the actual position values are displayed in terms of the reference pulse (also see the section: Drive-Controlled Referencing) and positioned to spindle angle position.

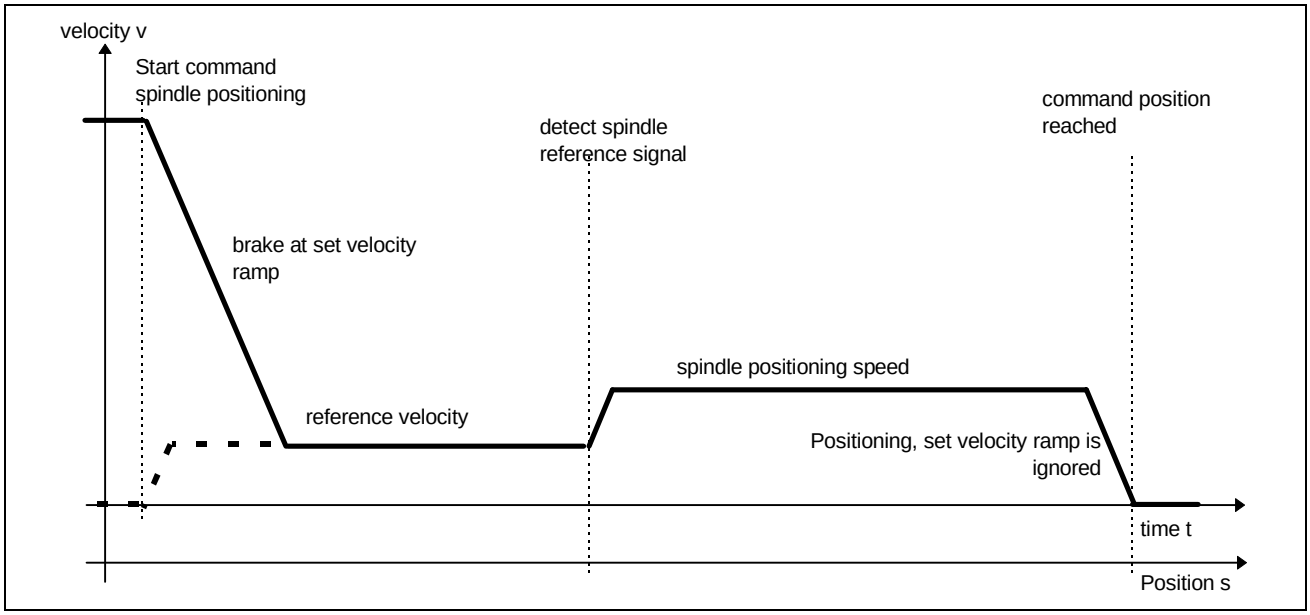


Fig. 9.39: Velocity/time diagram of spindle positioning with referencing

Positioning

With the command spindle positioning, it is possible to position the spindle via an encoder or a spindle reference switch.

Which positioning procedure is actually used depends on the way the motor is mechanically coupled to the spindle.

Spindle motor coupling	Positioning procedure: Spindle positioning via...		
rigid coupling, i = 1	motor feedback		
gearbox and indexing mechanical, non-slip, i≠1		spindle reference switch	spindle feedback
belt coupling, slip			spindle feedback

Fig. 9-40: Positioning procedure depends on spindle/motor coupling

Note: Spindle reference switch equals reference point switch

spindle feedback equals an optional encoder

Positioning to Feedback

If command spindle positioning is conducted with a feedback then the encoder used determines the degree of accuracy of the positioning procedure.

Positioning accuracy

Measuring system	Used as ..	Positioning accuracy
high-resolution motor feedback (with 2AD and ADF: type 3)	motor feedback	abs.:±0,02grd (±1,2') rel.: ±0,01'
digital servo feedback (with 2AD and ADF: type 6 u.7) (with MDD: type L u. M)	motor feedback	abs.:±0,009grd (±0,5') rel.: ±0,01'
high-resolution main spindle position encoder (with 1MB)	motor feedback	see doc. No. 209-0042-4119
high-resolution main spindle position encoder	spindle feedback	see doc. No. 209-0042-4119
incremental encoder with square-wave signals TTL	spindle feedback	abs.:see manuf. rel.: equals inc.
incremental encoder with sine signals $1V_{SS}$	spindle feedback	abs.: see manuf. rel.: 2^{-10}/Incr.
GDS, digital single turn encoder	spindle feedback	see doc. Nol. 209-0069-4360

Fig. 9-41: For spindle positioning with measuring systems and their resolutions

The achievable positioning accuracy at the spindle depends on:

- the absolute accuracy of the measuring system used as feedback
- the accuracy of the mechanical transmission components

Data about the spindle reference switch

Positioning with a spindle reference switch

If the spindle is coupled to the motor via a slip free gearbox then positioning to an operating cam mounted to the spindle is possible.

Mounting the spindle reference switch

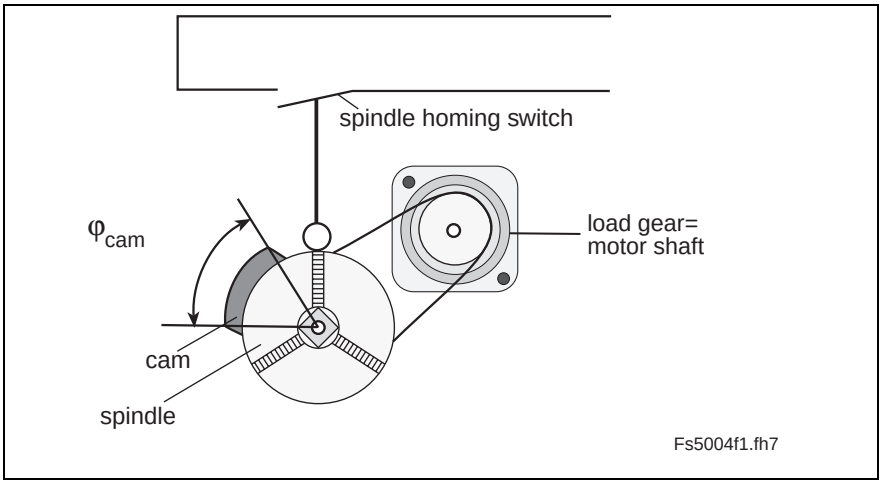


Fig. 9-42: Cam angle of the spindle reference switch

Accuracy of Spindle Reference Switch Detection

The accuracy of tis type of positioning is less than with positioning with a spindle encoder. The encoder-specific information about positioning accuracy also applies in this case!

$$\Delta\varphi_{max} = n_{ref} * 250\mu s * \frac{360° * min}{60s}$$

$\Delta\varphi$ max : greatest inaccuracy with the detection of the spindle reference signal

n_{ref}: referencing velocity in min^{-1}

Fig 9-43: Computing the systematic inaccuracy of spindle reference signals detection

To make sure that the spindle reference signal is correctly read in, the operating cam must cover a minimum angle:

$$\varphi_{Nocken} > n_{ref} * 250\mu s * \frac{360° * min}{60s}$$

φNocken : angle of the operating cam

n_{ref}: referencing velocity in min^{-1}

Fig 9-44: Computing the cam angle

The minimum angle of the operating cam computed as above simultaneously represents the systematic inaccuracy of spindle reference switch detection.

Detecting the Spindle Reference Switch Signal

The spindle reference signal is detected before the command is executed and always at the same spot. The rotational direction of the spindle is irrelevant.

If a clockwise rotational direction has been set in **S-0-0147, Homing parameter**, then the clockwise turning of the spindle sets the position of the rising right switching edge as the reference position.

A counterclockwise rotation of the spindle sets the position of the falling right switching edge as the reference position.

If a counterclockwise rotational direction has been set in **S-0-0147, Homing parameter,** then the counterclockwise turning of the spindle sets the position of the rising left switching edge, and with a clockwise rotation of the spindle the position of the falling left switching edge as the reference position.

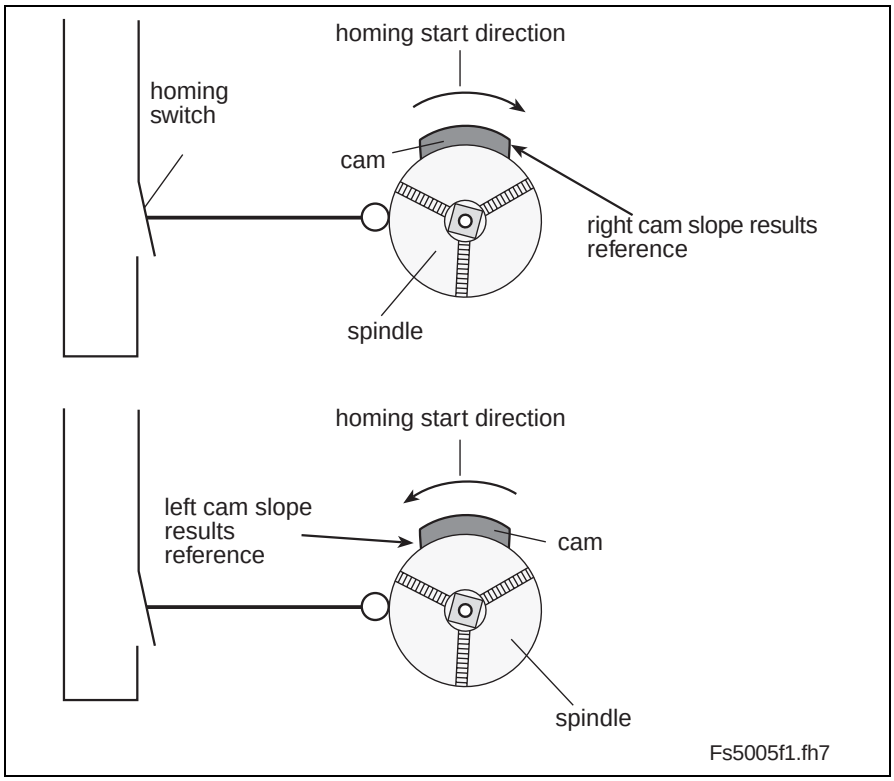


Fig. 9-45: Reference position with spindle positioning

The Affects of Control Hysteresis

If a referenced spindle is positioned to the reference switch out of differing rotational directions, then the degree of inaccuracy is increased in terms of the hysteresis of the control cam.

Reason: Inaccuracy is increased because the switching edge that is evaluated alternates between the positive and negative one.

Starting Up Spindle Positioning

Pre-programming

First, the basic configuration of the drive must be completed particulary

- the encoder system
- controller settings including position control
- all settings of the position data (the position reference to the reference point should be set or it should be possible to conduct the command drive-guided referencing)
- parameters **S-X-0124, Standstill window, S-X-0157, Velocity window** and **S-X-0057, Position window** must contain usable values.

Note: Spindle positioning can be started if the spindle is standing still or turning.

Selecting the positioning procedure

With parameter **S-0-0147, Homing parameter** it is possible to select between:

- positioning with an encoder or
- positioning with a spindle reference switch

Bits 3, 5 and 6 are of the parameter are important for spindle positioning:

S-0-0147	Positioning procedure
Bit 3 = 0 Bit 5 = 0 Bit 6 = 1	Positioning with spindle reference switch
Bit 3 = 0 Bit 5 = 1 Bit 6 = 0	Positionining with motor encoder
Bit 3 = 1 Bit 5 = 1 Bit 6 = 0	Positionining with spindle encoder

Fig. 9-46: Selecting the positioning procedure

The type of spindle positioning can be set in **Parameter S-X-0154, Spindle position parameter**. It is possible to individually set:

- spindle moving clockwise
- spindle moving counterclockwise
- shortest path
- absolute positioning
- relative postioning

S-X-0154 can be individually set in each parameter block.

Spindle turning clockwise or counterclockwise / shortest path

The rotational direction of the drive is set in **Bits 0 and 1**.

Note: The positioning direction "clockwise" or "counterclockwise" is only noted if the spindle is standing still prior to start of the command or moving at a speed smaller than set in **S-X-0124, Standstill window**. If the spindle is already turning, then positioning takes place out of the current rotational direction.

Absolute/relative positioning

Bit 2 sets whether a spindle angle position is to be approached (absolute positioning) or whether the spindle path is to be run (relative positioning).

Note: It makes sense to have the spindle standing still before switching from absolute to relative positioning to start the traversing angle with a defined start position. The switch from absolute to relative positioning and vice versa is immediate even if the spindle positioning command is running.

Select spindle position / spindle path

Four spindle positions and paths can be stored in the drive which the drive can, upon command, run.

The positions are stored in parameters

- **P-0-0312, Spindle position 1**
- **P-0-0313, Spindle position 2**
- **P-0-0314, Spindle position 3**
- **P-0-0315, Spindle position 4**

the paths in parameters

- **P-0-0322, Spindle relative offset 1**
- **P-0-0323, Spindle relative offset 2**
- **P-0-0324, Spindle relative offset 3**
- **P-0-0325, Spindle relative offset 4**

To select one of the four, use inputs POS1 and POS2 on DEA04.2M.

Level at POS1	**Level at POS2**	
0 Volt	0 Volt	Spindle position 1 or Spindle path 1 has been selected
24 Volt	0 Volt	Spindle position 2 or Spindle path 2 has been selected
0 Volt	24 Volt	Spindle position 3 or Spindle path 3 has been selected
24 Volt	24 Volt	Spindle position 4 or Spindle path 4 has been selected

Fig. 9-47: Select spindle position / spindle path

The selected spindle position or path is copied into parameters **S-0-0153, Spindle angle position** or **S-0-0180, Spindle relative offset** and run at the start of the command.

Executing spindle positioning

The command is started by applying 24 volts with drive enable applied to input POSSTART on DEA4.2.

Once the command is conducted, the spindle is in position at command position (**S-0-0153, Spindle angle position**) or has turned around the relative position (**S-0-0180, Spindle relative offset**).

The successful execution of the command can be queried in parameter **S-0-0013, Class 3 diagnostics**.

A control can conduct the output IN POS of DEA4.2. It reflects the status of **S-0-0013, Class 3 diagnostics**. It must be noted that the state of this signal must be updated no later than 10 ms after start of the spindle positioning or change in spindle position.

S-0-0013, Class 3 diagnostics Bit 6 (message inPosition) is set as soon as the spindle position is within the programmable tolerance range around the command position (**S-0-0153, Spindle angle position, ± S-X-0057, Position window**).

The following graphic illustrates this.

Message InPosition

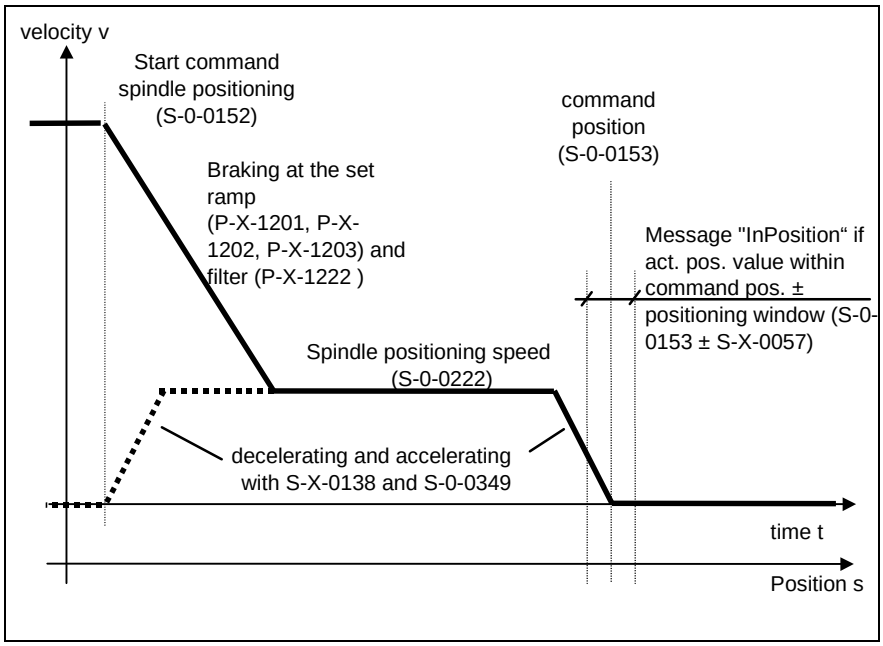

velocity v
Start command spindle positioning (S-0-0152)
command position (S-0-0153)
Braking at the set ramp (P-X-1201, P-X-1202, P-X-1203) and filter (P-X-1222)
Message "InPosition“ if act. pos. value within command pos. ± positioning window (S-0-0153 ± S-X-0057)
Spindle positioning speed (S-0-0222)
decelerating and accelerating with S-X-0138 and S-0-0349
time t
Position s

Fig. 9.48: Velocity/time diagram with in position message when spindle positioning

Diagnostic Messages

While executing command spindle positioning, the following diagnostic messages can occur.

Messages with error-free execution

While the command is being executed the H1 display of the controllers reads "C9“.

Messages with faults

C902 Spindle positioning requires drive enable:

Drive enable not set at the start of the command.

⇒ Set drive enable prior to command start!

C904 Encoder 2 not present:

The direct measuring system needed as per the homing parameter (spindle feedback or external encoder) is either missing or not connected.

⇒ Check spindle feedback connection.

C905 Positioning with non-init. absolute encoder impossible:

Motor or spindle feedback is an absolute encoder. The spindle, however, cannot position as command "Set absolute dimension" has not yet been executed.

⇒ Command **P-0-0012, C300 Command 'Set absolute measurement'** must be executed
(see functional description: "Set absolute dimension").

Other fault causes

If the spindle turns after command start without positioning:

- The spindle reference switch is not recognized.

⇒ Check spindle reference switch and wiring functions!

- or -

- Value in parameter **S-X-0157, Velocity window** is at 0.

If the spindle runs to the wrong target position:

- The value in parameter **S-0-0103, Modulo value** is not equal to 360.
- Gear ratio not correct (with positioning via motor feedback with spindle reference switch).

⇒ Enter correct gear ratio in parameter **S-X-0121** and **S-X-0122**, **Output revolutions of load gear** and **-Input revolutions of load gear**.

- or -

- Motor or spindle feedback faulty or not synchronous

⇒ Motor or spindle feedback and its synchronization must be checked in the relevant parameters.

- or -

- Parameter **S-0-0076, Position data scaling type** for position data is incorrectly set.

If the drive shuts down with error message "F228 Excessive deviation":

The spindle cannot follow the internally set position command values.

⇒ Check whether the spindle is mechanically blocked.

⇒ Check whether the parameter value in **S-0-0159, Monitoring window**, is sufficiently high and increase, if necessary!

⇒ Reduce value in parameter **S-X-0138, Bipolar acceleration limit value**.

If the spindle is in the desired position, but "In position" is not signalled:

The spindle position cannot be held by position control in the positioning window around the position command value

⇒ Check whether **S-X-0057, Position window** on 0, if yes, change

⇒ Check whether **S-X-0124, Standstill window** correctly parametrized

⇒ Stabilize an erratic actual position value by changng position and speed control parameters!

⇒ If actual position value cannot be stabilized, increase the value in parameter **S-X-0057, Position window**

⇒ Check configuration of **S-0-0144, Signal status word** and **S-0-0013, Class 3 diagnostics**

Electrical Connection of the Reference Switch

In DIAX03/04 drives with analog interface, the reference switch is connected to plug-in card DEA04.2M.

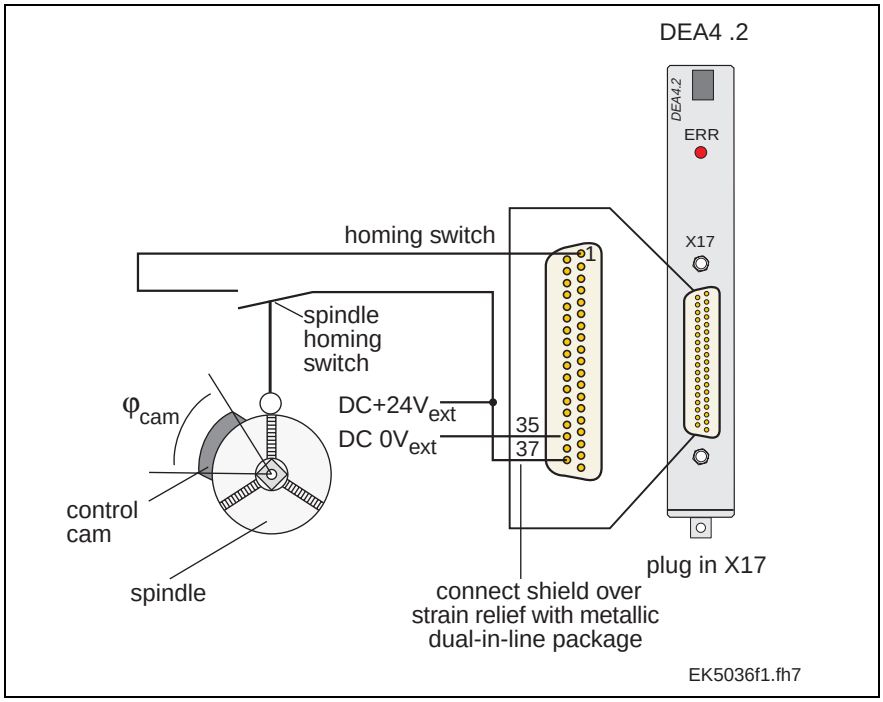


Fig. 9-49: Electrical connection of the spindle reference switch with DIAX03/04 Analog

9.10 Drive-controlled oscillation

Overview

Upon a command from the control the main spindle drive ignores the cyclical command value and turns alternately in a positive and negative direction (speed oscillation). The cyclical speed loss can be set with parameter. It is also symmetrically or asymmetrically implementable.

Application notes

With speed oscillation the main spindle drive supports

- a closing of the toothed wheels when switching the gear train,
- the closing of form-fitting coupling units, e.g., coupling of combustion motor probes at the test bench)

Pertinent Parameter

- **S-0-0190, D200 Drive-controlled oscillation command**
- **S-0-0215, Oscillation cycle time**
- **S-0-0213, Oscillation speed**
- **S-0-0214, Oscillation offset speed**

Functional Principle

Drive guided oscillating is adapted via parameters to the individual needs of the engage process. The pendle cycle time, pendle speed and pendle offset speed can be set.

Oscillation can be symmetrical or asymmetrical depending on oscillating speed to avoid tooth-to-tooth settings with the engage procedure.

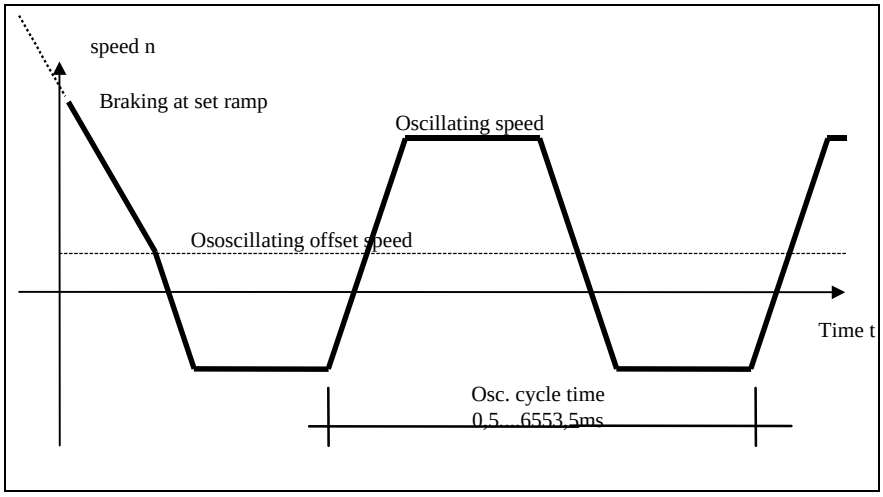


Fig. 9-50: Speed path with drive-guided oscillating

The drive-internal command value for oscillating is cyclically generated from offset speed +/- pendel speed. Any drive-internal ramps set are not active.

The parameter values for the drive-controlled oscillations can be changed during oscillation procedure. The drive responds to the new value no later than upon completely of oscillation cycle time.

Upon completion of the command, the drive accelerates to the set ramp at the currently pending command value.

Commissioning

Pre-settings

⇒ The value in **S-X-0157, Velocity window** must not equal zero!

⇒ The parameter value in **S-0-0215, Oscillation cycle time**, **S-0-0213, Oscillation speed** and **S-0-0214, Oscillation offset speed** must be checked and outfitted with values acceptable to the spindle mechanics. The value in **S-0-0215, Oscillation cycle time,** must range between 0.5 and 6553.5ms (step width 0.5ms)!

The duration and speed of the oscillating movement is set with the following parameters:

S-0-0215, Oscillation cycle time

Data contents:	Comments:
e.g., 400ms	an oscillating cycle takes 400 ms

Fig. 9-51: Data contents S-0-0215

S-0-0213, Oscillation speed

Data contents:	Comments:
8 Rpm	speed command value pendels +- 8 rpm around pendel offset speed

Fig. 9-52: Data contents S-0-0213

S-0-0214, Oscillation offset speed

Data contents:	Comments:
1 Rpm	the speed command value when oscillating has an offset of 1 rpm

Fig. 9-53: Data contents S-0-0214

Conducting Oscillating

If with drive enable, the input OSZILATE on DEA04.2M = 24 Volt, then the drive decels a turning motor to oscillating speed and starts the oscillation motion itself.

Level at OSZILATE	Drive-controlled oscillating
0 Volt	not active
24 Volt	active

Fig. 9-54: Triggering speed oscillating

Whether command drive-controlled pendeling is active, can be checked in S-0-0190:

S-0-0190, D200 Drive-controlled oscillation command

Data contents:	Comments:
00b	drive-guided pendeling not active
11b	drive-guided pendeling activev

Fig. 9-55: Data contents S-0-0190

'After setting input OSZILATE = 0 Volt the drive goes speed controlled at set ramp back to command value speed.

Diagnostics Messages

While the command is being executed, the H12 controller display reads "d2“.

The command is acknowledged in the data status as conducted if the motor speed generated by the pendel speed command is achieved for the first time within window **S-X-0157, Velocity window**.

Troubleshooting

If the controller is signalling D201:

Drive enable not applied at command start.

⇒ Set drive enable prior to command start!

If controller is signalling D202:

The spindle may turn with **S-0-0214**, **Oscillation offset speed.** It does not achieve internally acknowledge pendel offset speed as value in parameter **S-X-0157, Velocity window** is zero!

⇒ Enter value in parameter **S-X-0157, Velocity window** greater than zero!

If drive is oscillating but command status is not acknowledged:

The drive cannot sufficiently follow internally-generated speed command value.

⇒ Enter **S-0-0215, Oscillation cycle time** higher and **S-0-0213, Oscillation speed** lower.

9.11 Automatic Start/Delta Switch

Overview

Given a command from the control, the drive itself conducts a winding switch of the spindle motor. If the drive is in operation, then it remains at speed, power is removed for the duration of the switch and then picks up work after transition corresponding to current command value.

The star/delta switch implements a power contactor which are controlled via auxiliary contactors directly by the controller.

A succesful switch is signalled via auxiliary contacts of the power contactors back to the controller.

Application notes

With star(Y) delta(Δ) switch the torque power characteristics of the spindle for short-term operations without mechanical transition elements can be adapted for various machining demands:

Material removal (scrubbing): high torque, low speed

Fine machining (grinding): high speed, low torque

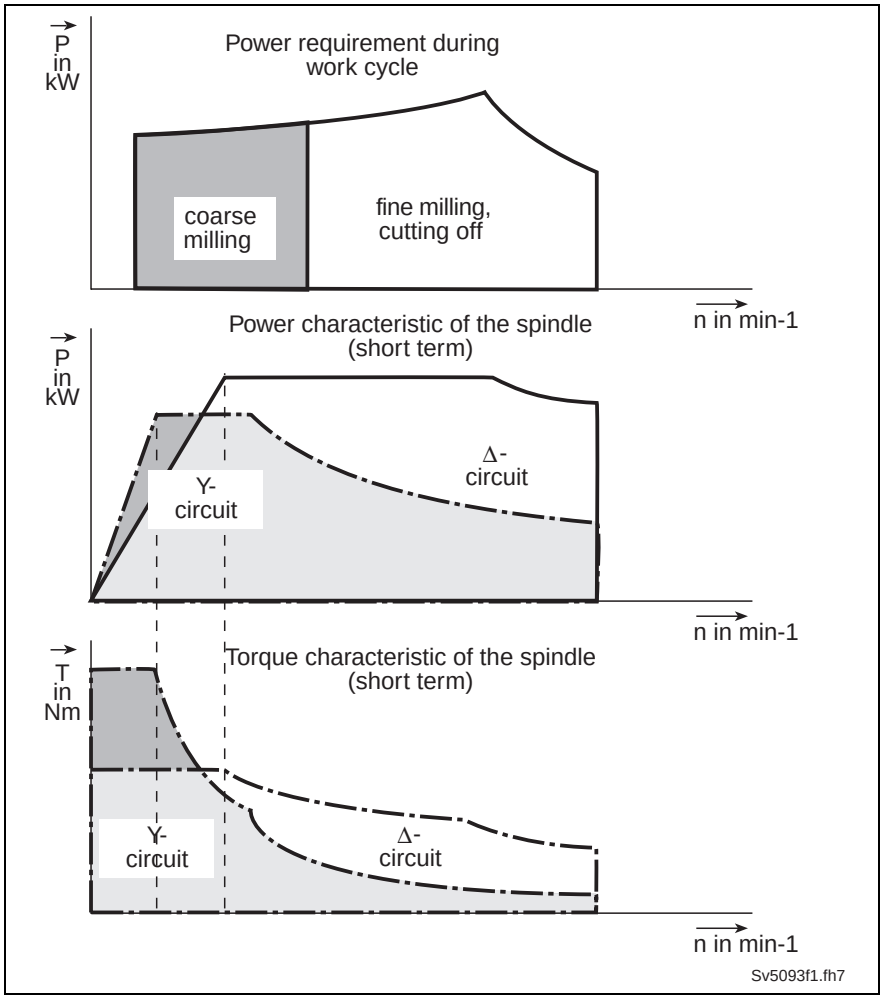


Fig. 9-56: Operating characteristics of a spindle with winding transition

The spindle drive power of star switch only equals about 2/3 of the drive power of star/delta switch, i.e., the star/delta switch is not a good replacement for gear switching as with each gearstage the same drive power is available!

The increased torque in short-term mode with star switch in contrast to delta switch is accompanied by an increase in continuous torque of the spindle!

Note: The increase of short-term torque achieved with Y-Δ-switch can also be achieved with increased type current of the controller with permanently switched motors. This eliminates long-term the contactor switch, which requires maintenance, which is accompanied by wiring work and decel problems in the event of mains failures!

For milling spindles, a star/delta switch is not suitable due to high runup times of start circuit!

Pertinent Parameter

- **S-0-0216, D100 Switch parameter set command**
- **S-X-0218, Gear ratio preselection**
- **S-0-0255, Actual gear ratio**

How the Star/Delta Switch works

Motor design

The star/delta switch can only be used with especially designed INDRAMAT motors. All six winding ends of this motor lead into the motor terminal box. Stndard motors are internally permanently set, only three power connections can be accessed!

Power connection

Motor power connection only via terminal box possible!

Switching in operation

The switch is triggered by switching into a different parameter block to which a different windings circuit has been allocated.

To enable the switch with a turning motor, it is necessary that the power connection of motor and auxiliary contactor correspond to the terminal diagram, see below, and are phase coincident (the motor voltage lies between Y and Δ-switch around 60°, the output voltage of the controller is switch clockwise before or after).

The drive returns to maching speed upon completion of the switch.

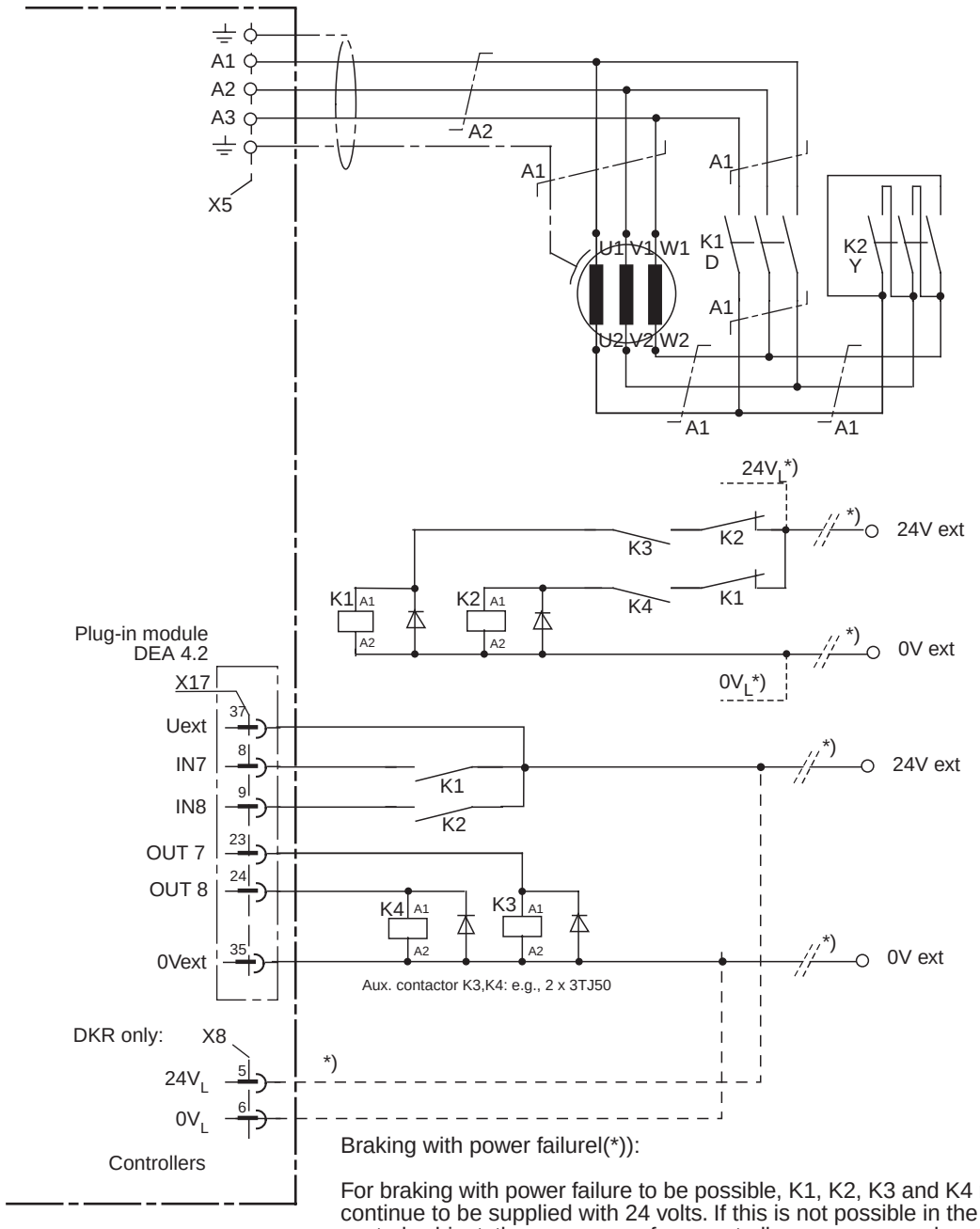
Deceling with mains failures

Deceling the spindle with mains failures is only possible if the power contactor is on for the duration of the decel procedure given mains failure. The deceleration of the spindle takes place in the last active parameter block which can cause long decel times with a Y-circuit!

Note: Star delta switch cannot be used simultaneously with gear switching!

Projecting Star/Delta Switching

Connection



Braking with power failurel(*)):

For braking with power failure to be possible, K1, K2, K3 and K4 must continue to be supplied with 24 volts. If this is not possible in the control cabinet, then use power from controller or power supply module (24/OV). To do so, use connections or breaks identified with *). Do not connect the 24Vext/OVext of cabinet with internal power of unit! Note maximum output current of unit!

Dimensioning power contactors:

K1: AC1-currrent >=nominal current of motor in star switch
K2: AC1-currrent >=0.58* nominal current of motor in star switch

Dimensioning motor power cable:

A1: as per nominal current of motor in star switch
A2: as per nominal current of motor in delta switch

Ap5149f1.fh7

Fig. 9-57: Terminal diagram for Y-Δ- switching

Contactors with small holding power can be supplied with power from the DKR or power supply module (DDS) of $24V_L/0V_L$. This voltage is maintained even with a mains failure as long as the drive feedback energy when decelerating!

Commissioning Star/Delta Switching

Presettings

⇒ Set the parameters for the allocation of the windings circuit:

- **S-X-0218, Gear ratio preselection**

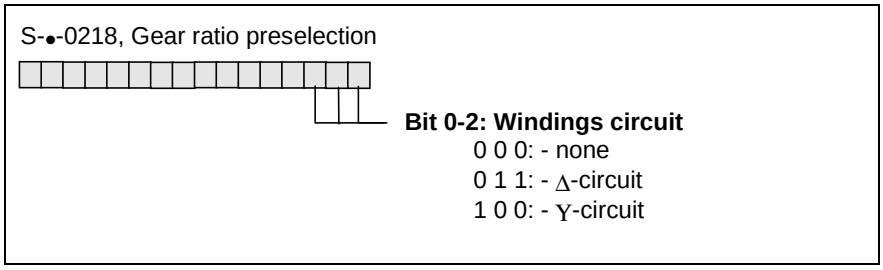


Fig. 9-58: Parameter values for allocation of windings circuit to switchable parameter blocks

⇒ In the Y-circuit parameter blocks, enter values for **S-X-0100, Velocity loop proportional gain** in contrast to basic setting, multiply with factor 0.6!

Note: If a motor with switchable winding is controlled then each of the four switchable parameter blocks must have a circuit type allocated to (Δ or Y) it even if all parameter blocks are not used!

Note: The drive controller recalculates the motor parameters by itself internally according to the changed wiring of the windings. You can not recall the recalculated parameter values! Only the motor parameter values for triangle wiring are shown.

Conduct windings transition

⇒ Start command **S-0-0216, D100 Switch parameter set command**.

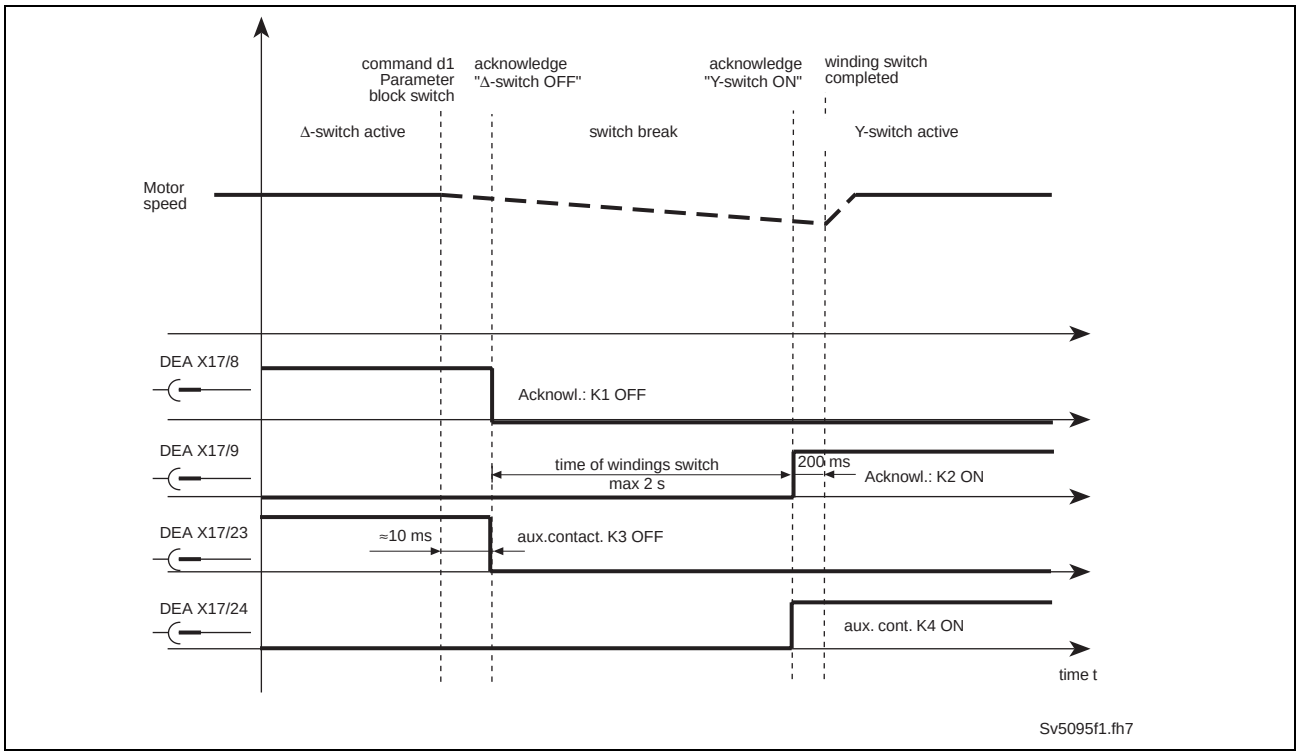


Fig. 9-59: Time diagram of signal for windings switch (example: switch from Δ to Y)

Note: The speed controller parameter S-X-0100, Velocity loop proportional gain and S-X-0101, Velocity loop integral action time must be separately optimized for each windings circuit as the torque constant is different for each type of circuit!

Diagnostic Messages

While the command is being executed, the H1 display on the controller reads "d1“.

Troubleshooting

If the controller is signalling C230:

Allocation of windings circuit not complete!

⇒ Windings circuit must be entered for each switchable parameter block (see also "Presettings").

If drive controller is signalling F863:

Windings switch acknowledgement missing!

⇒ Check contactor wiring and signal voltages.

⇒ Check contactor functions.

9.12 Automatic Gearbox Switching

Overview

A command from the control enables the drive to switch the gear ratio of a two-stage gearbox. The drive decels after the command to standstill and supports the transition with speed oscillation. A switching motor integrated in to the gears conducts the switch, it is directly controlled by the controller via auxiliary contactors.

The successful transition of the gear stages is signalled via an acknowledge contact on the controller integrated into the gear. The spindle accels after acknowledge to currently pending command value.

Application Notes

Using a switchable gear the torque power characteristics of the spindle can be adapted to different processing demands but still with the same spindle drive.

removal of materials (scrubbing): high torque, low speed

fine machining (polishing): high speed, low torque

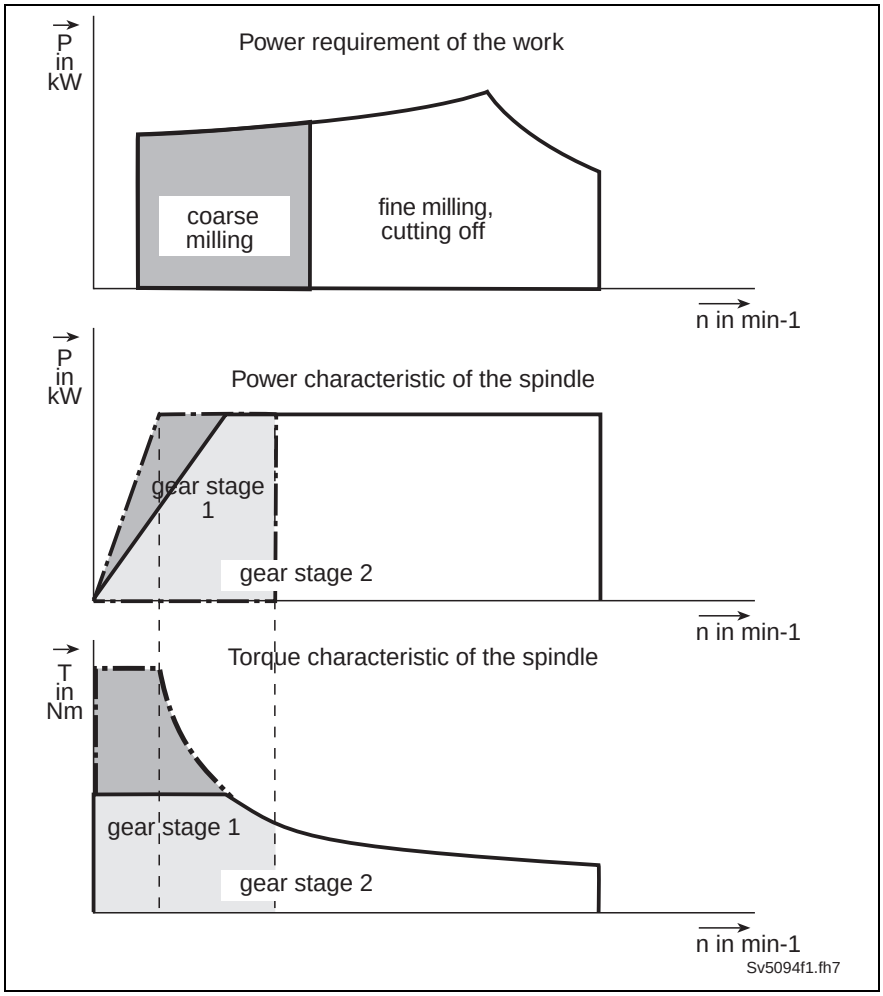


Fig. 9-60: Characteristics of a lathing spindle with gears

With the gear transition, the speed range at constant spindle drive power (range of processing) can be alternated between high speeds and low speeds.

Pertinent Parameters

- **S-0-0216, D100 Switch parameter set command**
- **S-X-0218, Gear ratio preselection**
- **S-0-0213, Oscillation speed**
- **S-0-0214, Oscillation offset speed**
- **S-0-0215, Oscillation cycle time**
- **S-0-0255, Actual gear ratio**
- **S-X-0121, Input revolutions of load gear**
- **S-X-0122, Output revolutions of load gear**

Functinal Principle

Gear switching is triggered by changing into a different parameter block which has a different gear ratio. The gear transition can take place in the processing cycle, the drive automatically goes back to machining speed upon successful transition.

Sequence

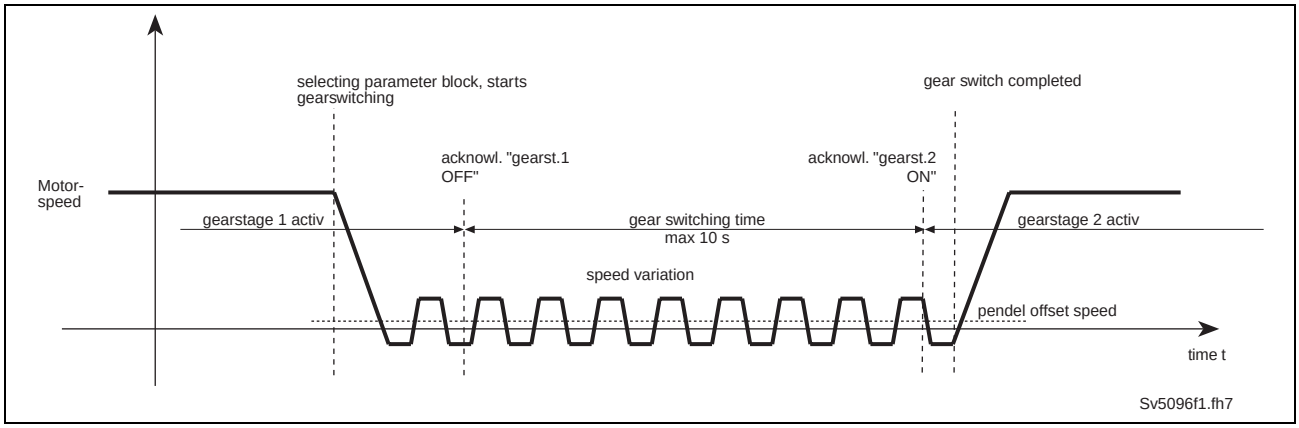


Fig. 9-61: Velocity/time diagram for automatic gear transitions

The pendle speed, cycle time and pendle offset speed are gear-specifically set. The pendel offset speed is a constant speed value added to the pendel speed. This avoid tooth-to-tooth settings of the gear stages during gear transitions.

Note: Gear transitions cannot be simultaneously used with start/delta transitions!

Projecting a Gear Transition

The automatic gear transition by the controller necessitates a two-stage gear with switching motor and acknowledge contacts.

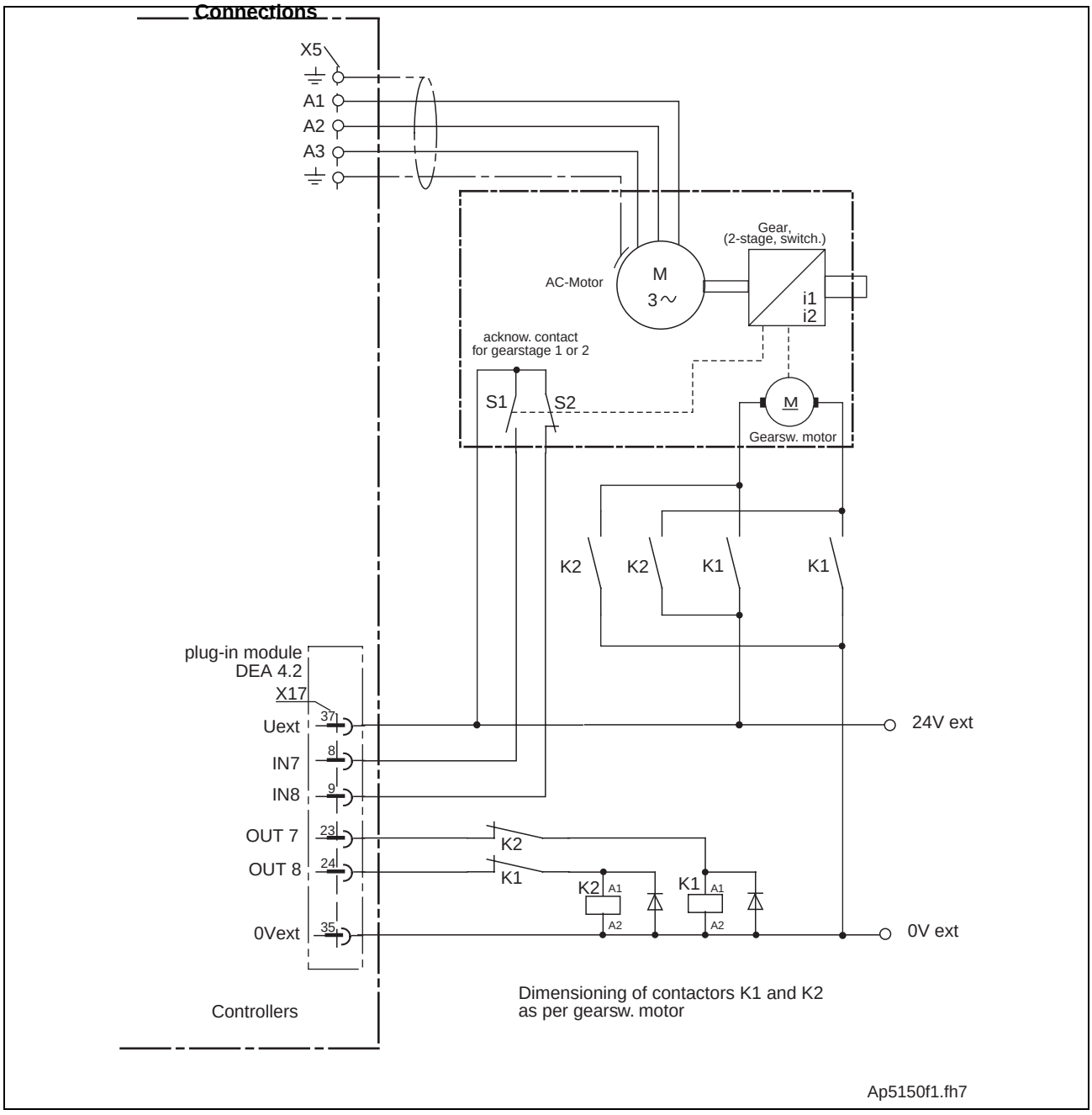


Fig. 9-62: Terminal diagram for gear transition

Commissioning Gear Transitions

Presettings

⇒ Set the parameters for gear stage allocation:

- **S-X-0218, Gear ratio preselection**

S-X-0218, Gear ratio preselection

Bit 0-1: Gear ratio preselection
0 0: - none
0 1: - gear stage 1
1 0: - gear stage 2

Fig. 9-63: Parameter values for gear stage allocation of switchable parameter blocks

Note: If a switchable gear can be controlled by the drive then each of the four switchable parameter blocks must be allocated a gear stage (1 or 2). This also applies even if not all parameter blocks are used!

⇒ In the gear stage dependent parameter blocks, enter parameter **S-X-0121, Input revolutions of load gear / S-X-0122, Output revolutions of load gear**. Unused parameter blocks can remain at default value ("1“).

⇒ Set parameter values for speed oscillation: For 2AD or ADF motors with mounted two-stage gears from ZF we recommend:

Parameter number	Parameter name	Recommended value
S-0-0213	Oscillation speed	8 min^{-1}
S-0-0214	Oscillation offset speed	1 min^{-1}
S-0-0215	Oscillation cycle time	400 ms

Fig. 9-64: Parameter values for gear transitions

⇒ The value in **S-X-0157, Velocity window** must be greater than zero!

Conduct gear transition

WARNING

Drive immediately moves into gear stage with initial drive enable if this is active
Danger from sudden speed oscillations.
⇒ Secure working area of spindle!

⇒ Start command **S-0-0216, D100 Switch parameter set command**.

If a different stage is allocated to the new parameter block, then the drive decels to oscillation speed and tries to move into the new gear stage.

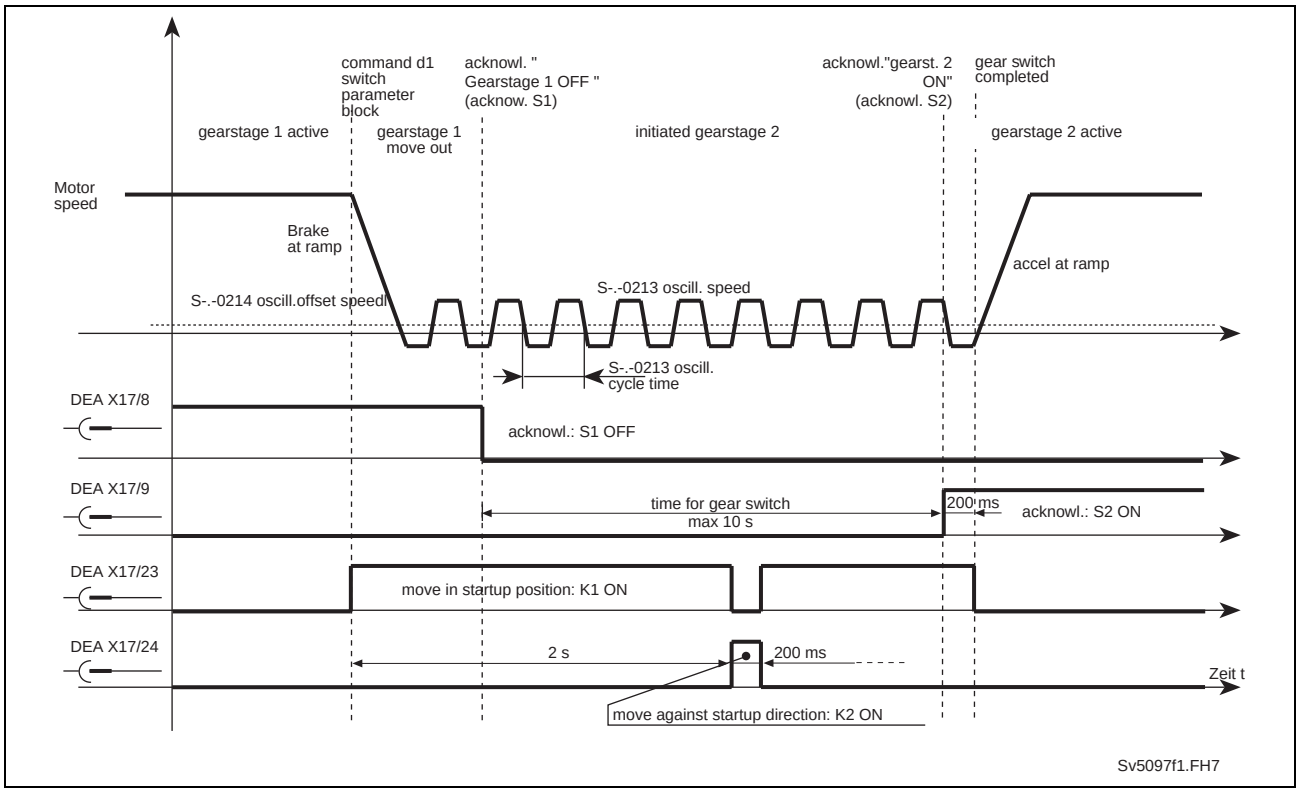


Fig. 9-65: Time diagram of signals for gear transition (example: switch from stage 1 to 2)

With completed gear transition, the drive accels to currently pending command value and finishes machining!

Diagnostic Messages

While the command is being executed, "d!" is in the controller display.

Troubleshooting

If controller signalling C230:

Gear stage allocation incomplete!

⇒ Gear stage preselect each switchable parameter block (see also "Preselection").

If controller signalling F862:

Acknowledge for gear stage transition is missing.

⇒ Check gear stage for correct transition and acknowledge functions.

⇒ Check wiring and signal voltages.

If controller signalling D101:

The oscillation offset speed **(S-X-0214)** cannot be achieved!

⇒ Parameter **S-X-0157, Velocity window** must not equal 0.

⇒ Check whether spindle mechanically blocked.

⇒ Check whether motor line broken.

10 Glossary

Data status

Every parameter has at its disposal a data status. It can be read by the control via the required data channel. The information on the validity of the parameter or the command acknowledgment of the command are contained therein.

Error reaction or response

If an error is detected in the drive, then the drive reacts independently by executing an error reaction. At the end of each error reaction there is a deactivation of the drive. The error reaction type is dependent on the error class of the error that occurred as well as the setting in parameters P-0-0117..119.

E-Stop

E-Stop (Emergency Stop) is the determination for a hardware input at the drive controller. It is used to trigger the emergency stop function in the drive.

External encoder

An external measuring system is optional. It is generally mounted directly to the load. The actual feedback value of the encoder can be seen in S-0-0053, Actual feedback value 2. By activating the position control operating mode with encoder 2, the position control loop is closed with the help of the actual feedback value of the external encoder.

Ident Number

Every parameter is designated unambiguously by its ident number (IDN). It consists of these 3 components: S-Sercos/P-Product specific, parameter set (0..7) and a number (1..4096).

Load default or basic load

The control parameters are stored in the motor feedback data memory in both MDD and MKD motors. This makes it possible for the drive controller to work trouble-free with this motor. The control parameters have not been optimized for the application.

Modulo format

Both actual feedback and command values can be processed in modulo or absolute format. If modulo processing has been set, then the position data move within the range of 0..S-0-0103, modulo value. With this function, it is possible to realize an endlessly turning axis.

Motor encoder

The motor encoder is the measuring system that is used during commutation. A measuring system is absolutely necessary. The actual feedback value of the encoder can be seen in S-0-0051, Actual position value 1. By activating the position control operating mode with encoder 1, the position control loop is closed with the help of the actual position of the motor encoder.

Operating data

The operating data is data block element 7 of a parameter. The value of the parameter is stored there.

Operating mode

Operating mode is set in parameters S-0-0032..35. It determines in what way a command value is processed in the drive and eventually initiates an axis movement. The operating mode does not define how the command value reaches the drive.

Parameterization mode

The drive is in parameterization mode if communication phases 1..3 have been set. The drive cannot be activated (drive enable signal applied). Operating mode must first be switched into. Some parameters can only be written into during parameterization mode.

Programming module

The programming module contains the software and parameter memory. It is mounted in slot U5. When exchanging the controller, a simple insertion of the programming module out of the old into the new unit means that the features of the replaced unit have been transferred to the new one.

Home Switch

If during the command **S-0-0148, C600 Drive controlled homing** several reference marks can be reached within the travel range, it's the home switch which must specify one singular mark. The home switch is connected to the respective input at the drive and activated by bit 5 in S-0-0147, Homing Parameter. This input is mirrored in the parameter **S-0-0400, Home switch**.

Scaling

The combination of unit and number of decimal places of a parameter are defined as scaling. It can be set for position, velocity and acceleration data.

Service Channel

The non-cyclic reading and writing of parameters via the SERCOS-Interface is done in the service channel

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DIAX04
Drive With Main Spindle Function,
Analog- and Parallelinterface

Supplement A
Parameter Description
AHS 03VRS

DOK-DIAX04-AHS-03VRS**-FK01-EN-P

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1 General Information

Using This Manual

All standard and product specific parameters are listed in this chapter in a numerically ascending order.

This chapter supplements the feature description and represents a complete description of all parameters used in the Ecodrive software. The description of the individual parameters is divided into two subsections.

1) General description

This section contains the feature or meaning of the parameter and tips for setting parameters.

2) Description of attributes

The characteristic values or features listed here help to classify the parameter. They are necessary for a complete description of the parameter. However, they are not required to get a general idea of the meaning of the parameter.

Definitions

The following abbreviations are used:

Data length:

2-byte - the data length for the operating data is 2 bytes.

4-byte - the data length for the operating data is 4 bytes.

1-byte variable - this is a piece of operating data of variable length (list). The length of a data unit is 1 byte.

2-byte variable - this is a piece of operating data of variable length (list). The length of a data unit is 2 bytes.

4-byte variable - this is a piece of operating data of variable length (list). The length of a data unit is 4 bytes.

Format:

BIN - the display format for the operating data should be binary.

HEX - the display format for the operating data should be hexadecimal.

DEC_OV - The display format for the operating data should be decimal without a sign.

DEC_MV - The display format for the operating data should be decimal with a sign.

ASCII - the operating data is an ASCII string.

IDN - the operating data is an ID number (IDN).

Editability:

No - the operating data cannot be edited.

P2 - The operating data can only be edited in communications phase 2.

P23 - The operating data can only be edited in communications phases 2 and 3.

P234 - The operating data can be edited in any communications phase.

P3 - The operating data can only be edited in communications phase 3.

P4 - The operating data can only be edited in communications phase 4.

Memory:

fixed - the operating data is programmed in the drive (fixed value).

no - The operating data is not buffered in the drive; the value is undefined after the drive controller is switched on.

Param. EE - The operating data is buffered in E²prom of the programming module (DSM).

Ampl. EE - The operating data is buffered in E²prom of the drive controller.

Feedb. EE - The operating data is buffered in the E²prom of the motor feedback data memory (only in MHD- and MKD motors).

Validity check:

no - the operating data is not checked for validity.

Phase2 - the operating data is checked in the "Communications phase 3 transition check" command.

Phase3 - the operating data is checked in the "Communications phase 4 transition check" command.

Extreme value check:

no - the operating data is not checked for its extreme values when it is written to.

yes - the operating data is checked for its extreme values when it is written to.

Combination check:

no - the operating data is not checked (bitwise) for a valid combination with other parameter values when it is written to.

yes - The operating data is checked (bitwise) for a valid combination with other parameter values when it is written to.

Cyc. transmittable:

no - The operating data cannot be configured as cyclical data in the master data telegram or in the drive telegram.

AT - The operating data can be configured as cyclical data in the drive telegram.

MDT - The operating data can be configured as cyclical data in the master data telegram.

Default Value:

The default value indicates the value of the parameter loaded into fixed memory with the current version of firmware installed on the drive following the PL program load command and prior to user edits or loading saved parameter files.

Notes

2 Standard Parameters

S-0-0011, Class 1 diagnostics

Function: Drive lock.

A Class 1 diagnostic error situation discovered by the drive leads to:

1. The drive's error response, as described in the functional description under "Error".
2. Setting the static error bits to 1 for Class 1 diagnostic in the drive status. The error bit will not be set back to 0 by the drive until no Class 1 diagnostic error remains and command **S-0-0099, C500 Reset class 1 diagnostic** has been received by the drive via the service channel.

Parameter structure:

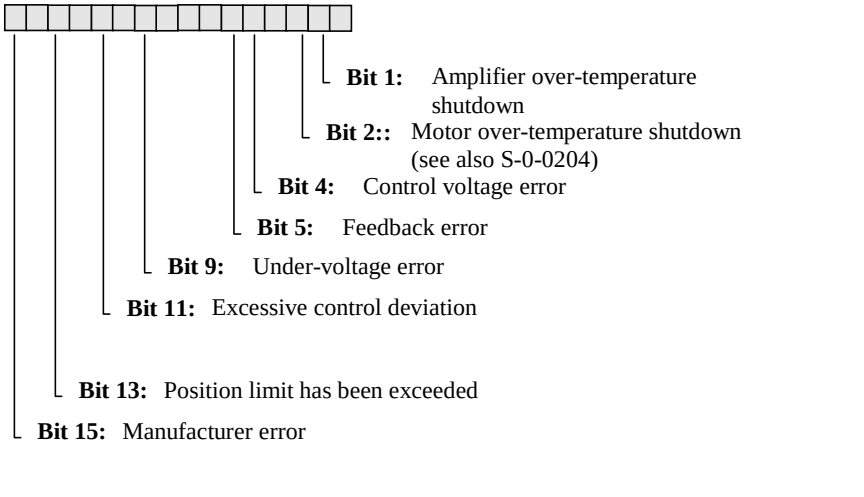
Bit 1: Amplifier over-temperature shutdown
Bit 2:: Motor over-temperature shutdown (see also S-0-0204)
Bit 4: Control voltage error
Bit 5: Feedback error
Bit 9: Under-voltage error
Bit 11: Excessive control deviation
Bit 13: Position limit has been exceeded
Bit 15: Manufacturer error

Fig. 2-1: S-0-0011, Class 1 diagnostics

Note: Only the bits indicated here are supported by the software.

See also the functional description: "S-0-0011, Class 1 diagnostics".

S-0-0011 - Attributes

Para. Name:	**DE**	Zustandsklasse 1		
	EN	Class 1 diagnostics		
	FR	Diagnostic de classe 1 (C1D)		
	ES	Diagnosticos clase 1		
	IT	Diagnostica Classe 1		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0012, Class 2 diagnostics

Function: Shutdown warning.

When a warning appears or disappears in Class 2 diagnostics, the change bit in the drive status word will be set to 1. When Class 2 diagnostics are read over the service channel, the change bit is reset to 0.

Parameter structure:

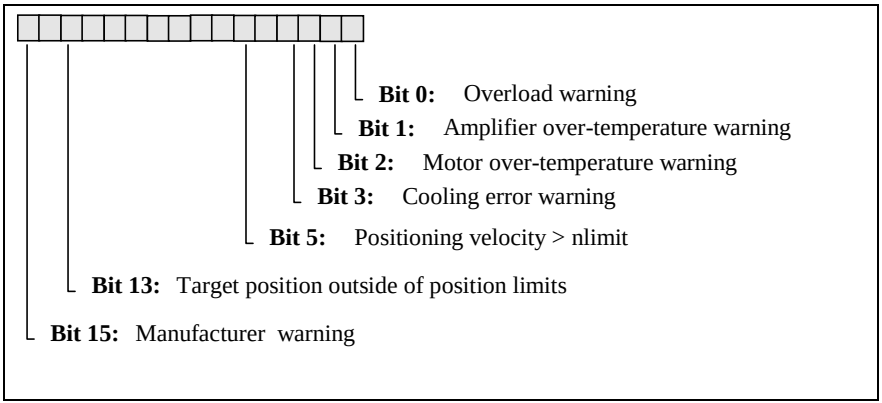
Bit 0: Overload warning
Bit 1: Amplifier over-temperature warning
Bit 2: Motor over-temperature warning
Bit 3: Cooling error warning
Bit 5: Positioning velocity > nlimit
Bit 13: Target position outside of position limits
Bit 15: Manufacturer warning

Fig. 2-2: S-0-0012, Class 2 diagnostics

Note: Only the bits indicated here are supported by the software.

See also the functional description: "S-0-0012, Class 2 diagnostics".

S-0-0012 - Attributes

Para. Name:	**DE**	Zustandsklasse 2		
	EN	Class 2 diagnostics		
	FR	Diagnostic de classe 2 (C2D)		
	ES	Diagnosticos clase 2		
	IT	Diagnostica Classe 2		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0013, Class 3 diagnostics

Function: **Operating status messages**.

When a message appears or disappears in Class 3 diagnostics, the change bit for Class 3 diagnostic in the drive status word will be set to 1. When Class 3 diagnostics are read via the service channel, the change bit is reset to 0.

Parameter structure:

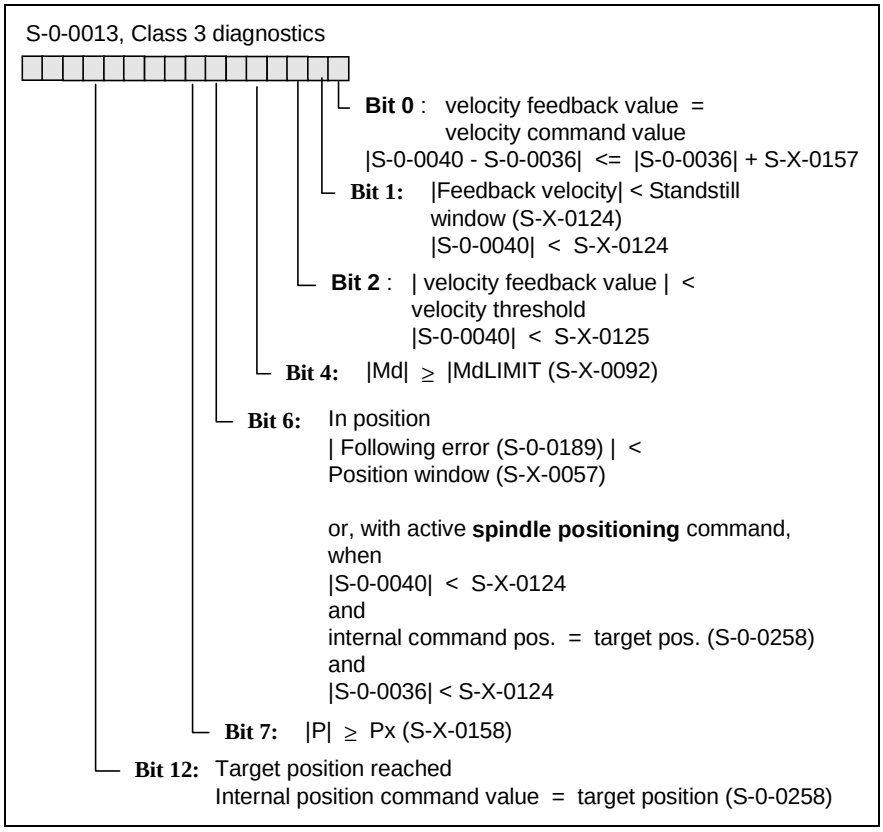
S-0-0013, Class 3 diagnostics
Bit 0 : velocity feedback value = velocity command value
|S-0-0040 - S-0-0036| <= |S-0-0036| + S-X-0157
Bit 1: |Feedback velocity| < Standstill window (S-X-0124)
|S-0-0040| < S-X-0124
Bit 2 : | velocity feedback value | < velocity threshold
|S-0-0040| < S-X-0125
Bit 4: |Md| ≥ |MdLIMIT (S-X-0092)
Bit 6: In position
| Following error (S-0-0189) | < Position window (S-X-0057)
or, with active spindle positioning command, when
|S-0-0040| < S-X-0124
and
internal command pos. = target pos. (S-0-0258)
and
|S-0-0036| < S-X-0124
Bit 7: |P| ≥ Px (S-X-0158)
Bit 12: Target position reached
Internal position command value = target position (S-0-0258)

Fig. 2-3: S-0-0013, Class 3 Diagnostics

Note: Only the bits indicated here are supported by the software.

See also the functional description: "S-0-0013, Class 3 diagnostics".

S-0-0013 - Attributes

Para. Name:	**DE**	Zustandsklasse 3		
	EN	Class 3 diagnostics		
	FR	Diagnostic de classe 3 (C3D)		
	ES	Diagnosticos clase 3		
	IT	Diagnostica Classe 3		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0014, Interface status

In the least significant three bits (0, 1, 2), the current communication phase can be requested:

2: The drive is in parameter mode.

4: The drive is in operate mode.

Parameter structure:

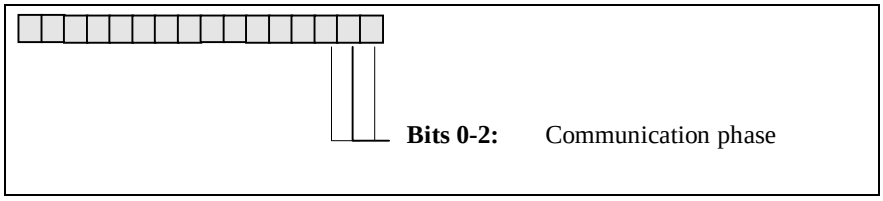

Fig. 2-4: S-0-0014, Interface status

S-0-0014 - Attributes

Para. Name:	**DE**	Schnittstellen-Status		
	EN	Interface status		
	FR	Etat d'interface		
	ES	Estado de interfaces		
	IT	Stato Interfaccia		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0017, IDN-list of all operation data

The ID numbers for all parameters with operation data available in the drive are accessible in this IDN list.

See also the functional description: "Parameter"

S-0-0017 - Attributes

Para. Name:	**DE**	IDN-Liste aller Betriebsdaten		
	EN	IDN-list of all operation data		
	FR	Liste des IDN de toutes les données d'exploitation		
	ES	Lista IDN de todos los datos de servicio		
	IT	Lista IDN di tutti i Dati operativi		
Function:		Parameter	**Editability:**	no
Data length:		2Byte var.	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0018, IDN-list of operation data for CP2

The the IDN-list contains the ident-numbers of all parameters that the drive checks in the transition command for phase 3. Only when the data of the listed ident-numbers are correct, the transition command can be acquitted positive, and the transition to communications phase 3 can be allowed.

See also the functional description: "IDN List of Parameters"

S-0-0018 - Attributes

Para. Name:	**DE**	IDN-Liste Betriebsdaten Kommunikationsphase 2		
	EN	IDN-list of operation data for CP2		
	FR	Liste IDN des données d'exploitation relatives à CP2		
	ES	Lista IDN datos de servicio fase de comunicación 2		
	IT	Lista IDN di tutti i Dati per fase di comm. 2		
Function:		Parameter	**Editability:**	no
Data length:		2Byte var.	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0019, IDN-list of operation data for CP3

The the IDN-list contains the ident-numbers of all parameters that the drive checks in the transition command for phase 4. Only when the data of the listed ident-numbers are correct, the transition command can be acquitted positive, and the transition to communications phase 4 can be allowed.

S-0-0019 - Attributes

Para. Name:	**DE**	IDN-Liste Betriebsdaten Kommunikationsphase 3		
	EN	IDN-list of operation data for CP3		
	FR	Liste IDN des données d'exploitation relatives à CP3		
	ES	Lista IDN datos de servicio fase de comunicación 3		
	IT	Lista IDN di tutti i Dati per fase di comm. 3		
Function:		Parameter	**Editability:**	no
Data length:		2Byte var.	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0021, IDN-list of invalid op. data for comm. Ph. 2

The drive checks whether all communications parameters are complete and correct before executing a delayed phase switch from 2 to **S-0-0127, C100 Communication phase 3 transition check** with the control system-driven transition check command.

If the drive identifies one or more IDNs as invalid, it will write the operating data that is still needed or is invalid to this ID No. list. This will be displayed to the drive by command error diagnostic message **C101 Invalid communication parameter (S-0-0021)**.

See also the functional description: "IDN List of Parameters"

S-0-0021 - Attributes

Para. Name:	**DE**	IDN-Liste ungültige Betriebsdaten Phase 2		
	EN	IDN-list of invalid op. data for comm. Ph. 2		
	FR	Liste des IDN-données d'exploitation invalides phase 2		
	ES	Lista IDN de datos de servicio no validos fase 2		
	IT	Lista IDN dei Dati oper. invalidi per Comm. in Fase 2		
Function:		Parameter	**Editability:**	no
Data length:		2Byte var.	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0022, IDN-list of invalid op. data for comm. Ph. 3

Before the drive executes a delayed phase switch from 3 to **S-0-0128, C200 Communication phase 4 transition check** with the control system-driven transition check command, the drive will check parameters for the following conditions:

- Validity of the parameter
- The parameter value is found within the valid input range.
- Compatibility with other parameters.

If the result of a parameter check is negative, this operating data will be entered in the ID No. (IDN) list.

The drive then responds to the transition command with the communications error diagnostic messages

- **C201 Invalid Parameter(s) (->S-0-0022) or**
- **C202 Parameter limit error (->S-0-0022) or**
- **C203 Parameter calculation error (->S-0-0022)**

See also the functional description: "IDN List of Parameters"

S-0-0022 - Attributes

Para. Name:	**DE**	IDN-Liste ungültige Betriebsdaten Phase 3		
	EN	IDN-list of invalid op. data for comm. Ph. 3		
	FR	IDN-Liste données d'exploitation invalides phase 3		
	ES	Lista IDN de datos de servicio no validos fase 3		
	IT	Lista IDN dei Dati oper. invalidi per Comm. in Fase 3		
Function:		Parameter	**Editability:**	no
Data length:		2Byte var.	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0025, IDN-list of all procedure commands

The data of the IDN-list contains the ident-numbers of all commands in the drive controller.

See also the functional description: "Commands"

S-0-0025 - Attributes

Para. Name:	**DE**	IDN-Liste aller Kommandos		
	EN	IDN-list of all procedure commands		
	FR	Liste des IDN de toutes les commandes		
	ES	Lista IDN de todos los comandos		
	IT	Lista IDN di tutti i Comandi		
Function:		Parameter	**Editability:**	no
Data length:		2Byte var.	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0026, Configuration list signal status word

The data of the parameters stores the ident-numbers of the signals or bits which the signal status word (S-0-0144) contains.

The order of the ident-numbers in the configuration list determines the bit enumeration, beginning with the LSB in the signal status word.

That means, the first ident-number in S-0-0026 defines the bit 0, the second ident-number in S-0-0026 defines bit 1 in the parameter **S-0-0144, Signal status word**, and so on.

Note: The signal status word is used in fieldbus drives for the internal communications betwen the two microcontrollers (exception: P-0-4048 = FFFFh).

See also the functional description: "Configurable signal status word"

S-0-0026 - Attributes

Para. Name:	**DE**	Konfigurations-Liste Signal-Statuswort		
	EN	Configuration list signal status word		
	FR	Liste de configuration pour mot d'état de signal		
	ES	Lista de configuración palabra de estado de señal		
	IT	Lista di Configurazione Parole di Stato Segnali		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte var.	**Memory:**	-
Format:		IDN	**Validity check:**	P3-4
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0030, Manufacturer version

The **version of the drive firmware** can be read from this parameter as plain text. The **structure** of the manufacturer version is defined as follows:

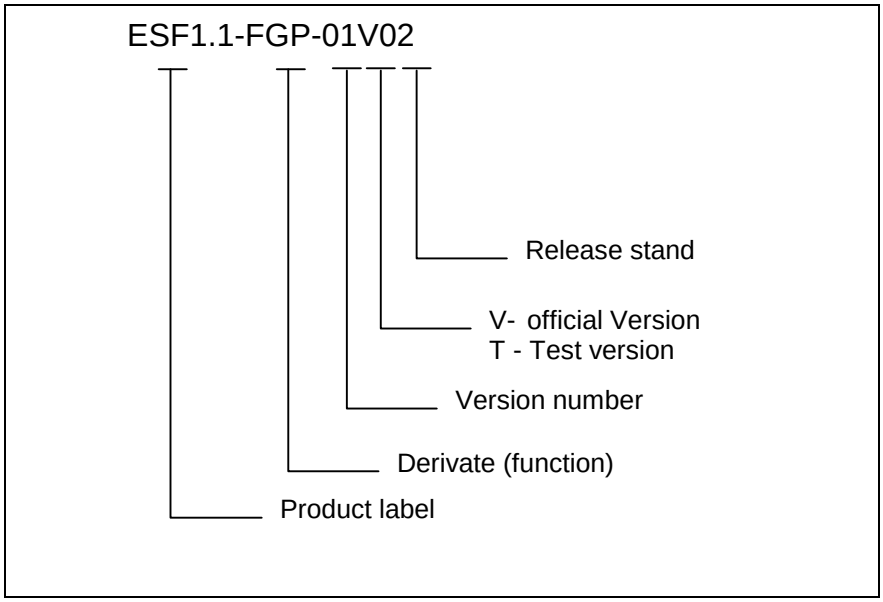

Fig. 2-5: Manufacturer Version

Examples:

HSM1.1-SSE-01V02

ESF1.1-FGP-01V02

See also the functional description: "Systemoverview"

S-0-0030 - Attributes

Para. Name:	**DE**	Hersteller-Version		
	EN	Manufacturer version		
	FR	Version du fabriquant		
	ES	Version de fabricante		
	IT	Versione Costruttore		
Function:		Parameter	**Editability:**	no
Data length:		1Byte var.	**Memory:**	-
Format:		ASCII	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0032, Primary mode of operation

The mode of operation defined in this parameter will be activated in the drive when

- the parameter set 0 is active in the drive.
- the control and power sections are **ready for operation**,
- the drive enable signal (RF) is set.

The operating mode can be selected by entering a bit list. Specific positions have a fixed definition in the bit list.

You can choose between working with position control without following (lag) error or with following error in **bit 3**.

The following applies to bit 3:

Bit 3 = 0 position control with lag (following error)

Bit 3 = 1 position control without lag (following error)

Bit list:	Meaning:
0000,0000,0000,0001	Torque control
0000,0000,0000,0010	Velocity control
0000,0000,0001,x011	Drive-controlled interpolation, encoder 1
0000,0000,0001,x100	Drive-controlled interpolation, encoder 2
0000,0010,0001,x011	Relative drive-controlled Interpolation, encoder 1
0000,0010,0001,x100	Relative drive-controlled Interpolation, encoder 2

Fig. 2-6: Setting of the operation mode parameters

See also the functional description: "Setting the Operating Mode Parameters".

S-0-0032 - Attributes

Para. Name:	**DE**	Hauptbetriebsart		
	EN	Primary mode of operation		
	FR	Mode de fonctionnement primaire		
	ES	Tipo de servicio principal		
	IT	Modo operativo primario		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	yes
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0033, Secondary operation mode 1

The mode of operation defined in this parameter will be activated in the drive when

- the parameter set 1 is active in the drive.
- the control and power sections are **ready for operation**,
- the drive enable signal (RF) is set.

The operating mode can be selected by entering a bit list. Specific positions have a fixed definition in the bit list.

You can choose between working with position control without following (lag) error or with following error in **bit 3**.

The following applies to bit 3:

Bit 3 = 0 position control with lag (following error)

Bit 3 = 1 position control without lag (following error)

Bit list:	Meaning:
0000,0000,0000,0001	Torque control
0000,0000,0000,0010	Velocity control
0000,0000,0001,x011	Drive-controlled interpolation, encoder 1
0000,0000,0001,x100	Drive-controlled interpolation, encoder 2
0000,0010,0001,x011	Relative drive-controlled Interpolation, encoder 1
0000,0010,0001,x100	Relative drive-controlled Interpolation, encoder 2

Fig. 2-7: Setting of the operation mode parameters

See also the functional description: "Setting the Operating Mode Parameters".

S-0-0033 - Attributes

Para. Name:	**DE**	Nebenbetriebsart 1		
	EN	Secondary operation mode 1		
	FR	Mode de fonctionnement secondaire 1		
	ES	Tipo de servicio secundario 1		
	IT	Modo operativo secundario 1		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	yes
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0034, Secondary operation mode 2

The mode of operation defined in this parameter will be activated in the drive when

- the parameter set 2 is active in the drive.
- the control and power sections are **ready for operation**,
- the drive enable signal (RF) is set.

The operating mode can be selected by entering a bit list. Specific positions have a fixed definition in the bit list.

You can choose between working with position control without following (lag) error or with following error in **bit 3**.

The following applies to bit 3:

Bit 3 = 0 position control with lag (following error)

Bit 3 = 1 position control without lag (following error)

Bit list:	Meaning:
0000,0000,0000,0001	Torque control
0000,0000,0000,0010	Velocity control
0000,0000,0001,x011	Drive-controlled interpolation, encoder 1
0000,0000,0001,x100	Drive-controlled interpolation, encoder 2
0000,0010,0001,x011	Relative drive-controlled Interpolation, encoder 1
0000,0010,0001,x100	Relative drive-controlled Interpolation, encoder 2

Fig. 2-8: Setting of the operation mode parameters

See also the functional description: "Setting the Operating Mode Parameters".

S-0-0034 - Attributes

Para. Name:	**DE**	Nebenbetriebsart 2
	EN	Secondary operation mode 2
	FR	Mode de fonctionnement secondaire 2
	ES	Tipo de servicio secundario 2
	IT	Modo operativo secondario 2

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	yes
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0035, Secondary operation mode 3

The mode of operation defined in this parameter will be activated in the drive when

- the parameter set 3 is active in the drive.
- the control and power sections are **ready for operation**,
- the drive enable signal (RF) is set.

The operating mode can be selected by entering a bit list. Specific positions have a fixed definition in the bit list.

You can choose between working with position control without following (lag) error or with following error in **bit 3**.

The following applies to bit 3:

Bit 3 = 0 position control with lag (following error)

Bit 3 = 1 position control without lag (following error)

Bit list:	Meaning:
0000,0000,0000,0001	Torque control
0000,0000,0000,0010	Velocity control
0000,0000,0001,x011	Drive-controlled interpolation, encoder 1
0000,0000,0001,x100	Drive-controlled interpolation, encoder 2
0000,0010,0001,x011	Relative drive-controlled Interpolation, encoder 1
0000,0010,0001,x100	Relative drive-controlled Interpolation, encoder 2

Fig. 2-9: Setting of the operation mode parameters

See also the functional description: "Setting the Operating Mode Parameters".

S-0-0035 - Attributes

Para. Name:	**DE**	Nebenbetriebsart 3
	EN	Secondary operation mode 3
	FR	Mode de fonctionnement secondaire 3
	ES	Tipo de servicio secundario 3
	IT	Modo operativo secondario 2

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	yes
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0036, Velocity command value

This parameter is used to set the velocity command value. This together with **S-0-0037, Additive velocity command value** determines the effective Velocity Command Value for the drive.

Note: In the position control operating modes, this parameter displays the output signal of the position controller.

See also the functional description: "Mode: Velocity Control"

S-0-0036 - Attributes

Para. Name:	**DE**	Geschwindigkeits-Sollwert
	EN	Velocity command value
	FR	Valeur de commande de vitesse
	ES	Valor nominal de velocidad
	IT	Valore di Velocità comandato

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	no
Unit:	S-0-0044	**Extrem value check:**	yes
Decimal places:	S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0037, Additive velocity command value

The additional velocity command value is added to the **S-0-0036, Velocity command value** in the drive.

See also the functional description: "Mode: Velocity Control"

S-0-0037 - Attributes

Para. Name:	**DE**	Geschwindigkeits-Sollwert additiv
	EN	Additive velocity command value
	FR	Valeur de commande de vitesse supplémentaire
	ES	Valor nominal adicional de velocidad
	IT	Comando di Velocità addizzionale

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	no
Unit:	S-0-0044	**Extrem value check:**	yes
Decimal places:	S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0040, Velocity feedback value

The velocity feedback value can be transferred from the drive control device to the control system either cyclically or via the service channel.

see also functional description "Preparations for Setting the Velocity Controller"

S-0-0040 - Attributes

Para. Name:	**DE**	Geschwindigkeits-Istwert		
	EN	Velocity feedback value		
	FR	Valeur de retour de vitesse		
	ES	Valor real de velocidad		
	IT	Feedback di Velocità		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		S-0-0044	**Extrem value check:**	no
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0041, Homing velocity

The product of **S-0-0041, Homing velocity** and **S-0-0108, Feedrate override** determines the velocity for the **S-0-0148, Drive controlled homing procedure** command.

If, in the case of an absolute encoder, the **S-0-0148, Drive controlled homing** procedure is initiated, then the drive will proceed with this velocity to the reference point (home position) that was determined with the **P-0-0012; set absolute measurement**, command.

See also the functional description: "Drive-Controlled Homing".

S-0-0041 - Attributes

Para. Name:	**DE**	Referenzfahr-Geschwindigkeit		
	EN	Homing velocity		
	FR	Vitesse de prise d'origine		
	ES	Velocidad de puesta a cero		
	IT	Velocità per Azzeramento		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0042, Homing acceleration

This parameter indicates the acceleration value at which the drive executes the command **S-0-0148, C600 Drive controlled homing procedure command**.

See also the functional description: "Drive-Controlled Homing".

S-0-0042 - Attributes

Para. Name:	**DE**	Referenzfahr-Beschleunigung		
	EN	Homing acceleration		
	FR	Accélération de prise d'origine		
	ES	Aceleración de puesta a cero		
	IT	Accellerazione per Azzeramento		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0160	**Extrem value check:**	yes
Decimal places:		S-0-0161/S-0-0162	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0043, Velocity polarity parameter

This parameter is used to switch the polarity of the velocity data in relation to the application.

Polarities are switched externally, at the input and output of a control system rather than inside the system.

The following applies to rotary motors:

Clockwise rotation when facing the motor shaft is the rule for a **positive** velocity command value and a positive polarity.

The following applies to linear motors:

The **positive direction** is used when the primary is moving **toward** the linear motor power **cable side**.

Parameter structure:

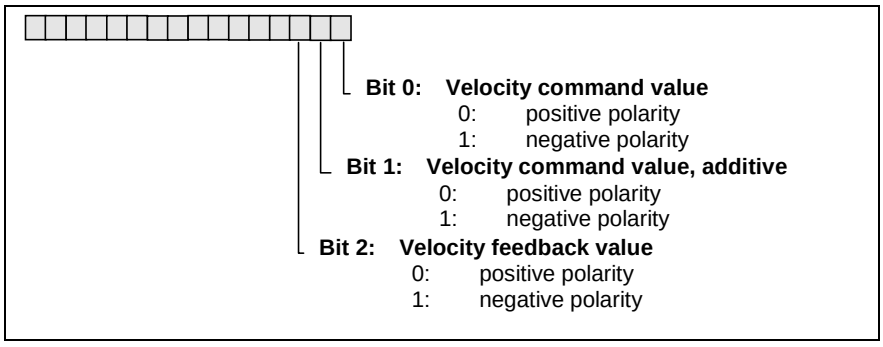

Fig. 2-10: S-0-0043, Velocity polarity parameter

Note: The bits 1 and 2 are copies of bit 0. Only changes of bit 0 have an effect. Different settings of the single bits are not possible!

See also the functional description: "Command polarities and actual value polarities".

S-0-0043 - Attributes

Para. Name:	**DE**	Geschwindigkeits-Polaritäten-Parameter
	EN	Velocity polarity parameter
	FR	Paramètre de polarité de vitesse
	ES	Parámetros de polaridad de velocidad
	IT	Parametro Direzione Velocità

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	yes
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0044, Velocity data scaling type

Various scaling types can be defined for the velocity data in the drive.

Examples: RPM → rotary

Structure of the parameter:

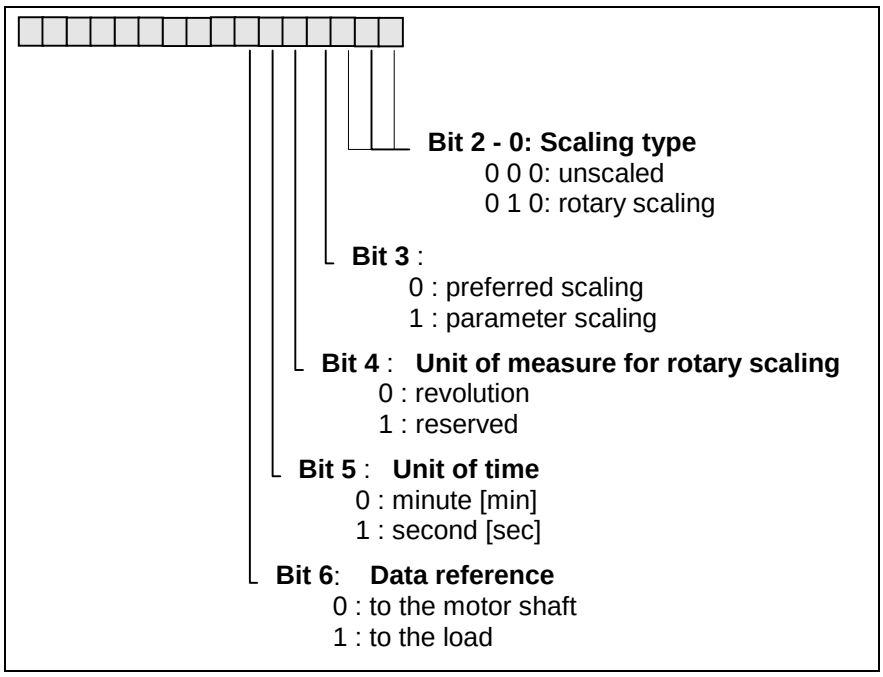
Bit 2 - 0: Scaling type
0 0 0: unscaled
0 1 0: rotary scaling
Bit 3 :
0 : preferred scaling
1 : parameter scaling
Bit 4 : Unit of measure for rotary scaling
0 : revolution
1 : reserved
Bit 5 : Unit of time
0 : minute [min]
1 : second [sec]
Bit 6: Data reference
0 : to the motor shaft
1 : to the load

Fig. 2-1: S-0-0044, Velocity Data Scaling Type

See also example under **S-0-0045, Velocity Data Scaling Factor** and functional description: "Velocity Data Display Format"

S-0-0044 - Attributes

Para. Name:	**DE**	Wichtungsart für Geschwindigkeitsdaten
	EN	Velocity data scaling type
	FR	Type de calibrage pour données de vitesse
	ES	Tipo de escala de datos de velocidad
	IT	Tipo di Scala per Dati di Velocità

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	yes
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0045, Velocity data scaling factor

This parameter defines the scaling factor for all velocity data in the drive.

If preferred scaling is set with **S-0-0044, Velocity data scaling type**, this parameter will be set to 1.

See also the functional description: "Velocity Data Display Format"

S-0-0045 - Attributes

Para. Name:	**DE**	Wichtungs-Faktor für Geschwindigkeitsdaten		
	EN	Velocity data scaling factor		
	FR	Facteur de calibrage pour données de vitesse		
	ES	Factor de escala para datos de velocidad		
	IT	Fattore di Scala per Dati Velocità		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0046, Velocity data scaling exponent

The scaling exponent for all velocity data in the drive is determined in this parameter.

See also functional description: "Velocity data display format".

S-0-0046 - Attributes

Para. Name:	**DE**	Wichtungs-Exponent für Geschwindigkeitsdaten		
	EN	Velocity data scaling exponent		
	FR	Exposant de calibrage pour données de vitesse		
	ES	Exponente de escala para datos de velocidad		
	IT	Esponente per Dati Velocità		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0047, Position command value

In the **position control** operation mode, this parameter is transferred from the control system to the drive every NC cycle time. In other operating modes, with the velocity loop closed in the drive, the active position command value of the position controller is displayed here. Then the position command is generated in the drive, depending on the active operation mode.

See also the functional description: "Mode: Position Control".

S-0-0047 - Attributes

Para. Name:	**DE**	Lage-Sollwert		
	EN	Position command value		
	FR	Valeur de commande de position		
	ES	Valor nominal de posición		
	IT	Valore di Posizione comandato		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0051, Position feedback 1 value

Position feedback value 1 represents the current position of the motor encoder. The initialization of the position feedback happens during the execution of **S-0-0128, C200 Communication phase 4 transition check**; that means, the feedback positions are only initialized after successful execution of the command.

If an absolute encoder is present, the value in **S-0-0051, Position Feedback 1 Value** then shows the absolute position referred to the machine's zero-point, provided that during the first setup the command **P-0-0012, C300 Command 'Set absolute measurement'** has been executed once.

In the other case, the initialization value depends on whether the parameter **P-0-0019, Position start value** has been written to during the phase progression or whether the motor feedback is an absolute encoder.

See also the functional description: "Setting the Measurement System".

S-0-0051 - Attributes

Para. Name:	**DE**	Lage-Istwert Geber 1		
	EN	Position feedback 1 value		
	FR	Valeur de retour de position codeur 1		
	ES	Valor real de posición 1		
	IT	Valore di Posizione di Feedback 1		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		S-0-0076	**Extrem value check:**	no
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0052, Reference distance 1

The parameter displays the distance between the machine zero-point and the homing point for the motor measurement system (Position feedback value 1). The parameter is used for the execution of the commands
S-0-0148, C600 Drive controlled homing procedure command and **P-0-0012, C300 Command 'Set absolute measurement'**.

During the command **S-0-0148, C600 Drive controlled homing procedure command**, the distance between the homing point and the machine zero-point is written there. If homing is done with run to the homing point, the drive goes to the homing point, and **S-0-0051, Position feedback 1 value** contains the value of **S-0-0052, Reference distance 1**.

For the command **P-0-0012, C300 Command 'Set absolute measurement'**, the desired value for **S-0-0051, Position feedback 1 value** is written there. After successful execution of 'Setting absolute measurement', **S-0-0051, Position feedback 1 value** shows the value of **S-0-0052, Reference distance 1**.

See also the functional description: "Drive-controlled homing".

S-0-0052 - Attributes

Para. Name:	**DE**	Referenzmaß 1		
	EN	Reference distance 1		
	FR	Distance de référence 1		
	ES	Medida de referencia valor de posición 1		
	IT	Distanza di Riferimento 1		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0053, Position feedback 2 value

Position feedback value 1 represents the current position of the **optional external encoder**. The initialization of the position feedback happens during the execution of **S-0-0128, C200 Communication phase 4 transition check**; that means, the feedback positions are only initialized after successful execution of the command.

If an absolute optional encoder is present, the value in **S-0-0053, Position Feedback Value 2** then shows the absolute position referred to the machine's zero-point, provided that during the first setup the command **P-0-0012, C300 Command 'Set absolute measurement'** has been executed once.

In the other case, the initialization value depends on whether the parameter **P-0-0019, Position start value** has been written to during the phase progression or whether an existing optional feedback is an absolute encoder.

See also the functional description: "Setting the Measurement System".

S-0-0053 - Attributes

Para. Name:	**DE**	Lage-Istwert Geber 2		
	EN	Position feedback 2 value		
	FR	Valeur de retour de position codeur 2		
	ES	Valor real de posición 2		
	IT	Valore di Posizione di Feedback 2		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		S-0-0076	**Extrem value check:**	no
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0054, Reference distance 2

The parameter displays the distance between the machine zero-point and the homing point for the external measuring system (Position feedback value 2). The parameter is used for the execution of the commands
S-0-0148, C600 Drive controlled homing procedure command and **P-0-0012, C300 Command 'Set absolute measurement'**.

During the command **S-0-0148, C600 Drive controlled homing procedure command**, the distance between the homing point and the machine zero-point is written there. If homing is done with run to the homing point, the drive goes to the homing point, and **S-0-0053, Position feedback 2 value** contains the value of **S-0-0054, Reference distance 2**.

For the command **P-0-0012, C300 Command 'Set absolute measurement'**, the desired value for **S-0-0053, Position feedback 2 value** is written there. After successful execution of ‘Setting absolute measurement’**, S-0-0053, Position feedback 2 value** shows the value of **S-0-0054, Reference distance 2**.

See also the functional description: "Drive-controlled homing".

S-0-0054 - Attributes

Para. Name:	**DE**	Referenzmaß 2		
	EN	Reference distance 2		
	FR	Distance de référence 2		
	ES	Medida de referencia valor de posición 2		
	IT	Distanza di Riferimento 2		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0055, Position polarities

This parameter can be used to invert the polarities of the given position data. These polarities are switched outside of the control system (i.e., at the input and output of the control system).

Note: The polarity of the position must be determined during the first setup of an axis *before* establishing a zero reference for the measurement systems, because changing the polarity results in different position values.

Note the following in reference to rotary motors:

"**Motor-clockwise rotation**" means the motor shaft turns in a clockwise direction (facing the motor shaft) if the position command value difference and the polarity are both positive.

The following applies to linear motors:

The positive direction is used when the primary is moving toward the linear motor power cable side

Bit 4 is used to activate or deactivate software position limits.

Parameter structure:

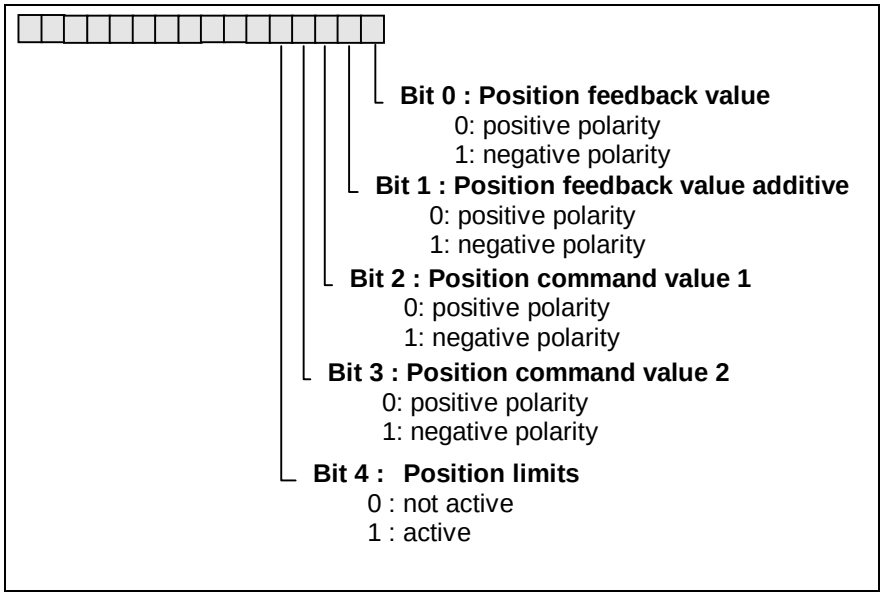
Bit 0 : Position feedback value
0: positive polarity
1: negative polarity
Bit 1 : Position feedback value additive
0: positive polarity
1: negative polarity
Bit 2 : Position command value 1
0: positive polarity
1: negative polarity
Bit 3 : Position command value 2
0: positive polarity
1: negative polarity
Bit 4 : Position limits
0 : not active
1 : active

Fig. 2-11: S-0-0055, Position polarity parameter

Note: - Only the bits indicated here are supported by the software.
- If bit 0 is changed by the control system, bits 1 - 3 will also be set to the value of bit 0 by the drive!

See also the functional description: "Command polarities and actual value polarities".

S-0-0055 - Attributes

Para. Name:	**DE**	Lage-Polaritäten
	EN	Position polarities
	FR	Polarités de position
	ES	Polaridades de posición
	IT	Direzioni di Posizionamento

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	yes
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0057, Position window

The parameter S-0-0057, Position window, is used for following functions:

- Status **In Position**,
  |following error (S-0-0189)| < Position window (S-0-0057)
  → bit 6 in **S-0-0013, Class 3 Diagnostics**
- Status **ITP**,
  |Target - act.pos.| < Position window (S-0-0057) &&
  |following error| < Position window &&
  |act. speed| < Standstill window (S-0-0124)
  → bit 6 in **S-0-0182, Manufacturer class 3 diagnostics**
- Status **In_Target_Position**,
  |Target - act.pos.| < Position window (S-0-0057)
  → Bit 10 in **S-0-0182, Manufacturer class 3 diagnostics**
- Status message **End Position reached**

  (|Target position - actual position value - ½| < S-0-0057, pos. window) & end of **following block sequence** reached.
- During the execution of the command **S-0-0148, C600 Drive controlled homing procedure command**, the drive reports completion of the command, when the internal command generator has reached its target value and the difference between this value and the actual position is smaller than the position window.
- As a hysteresis window for the position limits. I.e., when the drive has gone beyond the limit, the travel range is additionally limited by the position window.
- For the spindle positioning command to show that the spindle is in position.

See also the functional description: "S-0-0182, Manufacturer Class 3 Diagnostics".

S-0-0057 - Attributes

Para. Name:	**DE**	Positionierfenster
	EN	Position window
	FR	Fenêtre de positionnement
	ES	Ventana de posicionamiento
	IT	Finestra di Posizionamento

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	Phase3
Unit:	S-0-0076	**Extrem value check:**	yes
Decimal places:	S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0076, Position data scaling type

The position data scaling type determines, in which format position data are communicated between drive and control or display surface. When position parameters (e.g. **S-0-0051, Position feedback 1 value** are read, the drive displays them with the selected scaling. The scaling selection is usually preset by the PLC.

The following settings can be made:

Structure of the parameter:

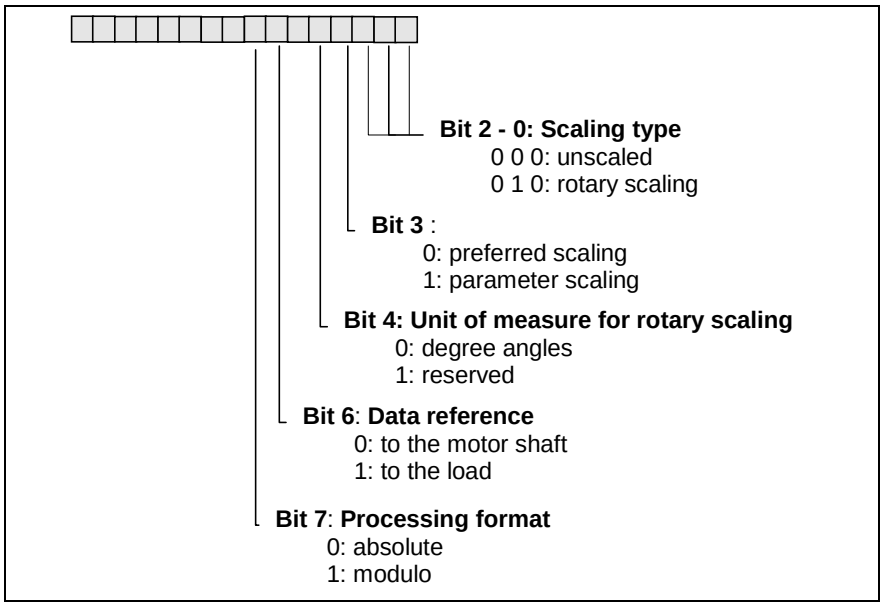

Fig. 2-12: S-0-0076, Position data scaling type

Note: Only the bits mentioned here are supported by the firmware.
1) See also S-0-0045, Scaling factor for velocity data.
2) See also the example S-0-0077, Scaling of position data.

See also the functional description: "Display Format of Position Data".

S-0-0076 - Attributes

Para. Name:	**DE**	Wichtungsart für Lagedaten		
	EN	Position data scaling type		
	FR	Type de calibrage pour données de position		
	ES	Tipo de escala para datos de posición		
	IT	Tipo di Scala per Dati Posizionamento		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	yes
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0079, Rotational position resolution

If rotary position scaling is selected, the LSB valence for all position data will be set in this parameter. The valence of the LSB in the drive's position data results in

$$\text{LSB valence} = \frac{1 \text{ Revolution}}{\text{Rotational position resolution}}$$

where bit 6 of **S-0-0076, Position data scaling type** selects whether the LSb valence refers to one motor revolution or one load revolution.

If you work with preferred rotary scaling, the value in S-0-0079, Rotational position resolution is fixed at 3 600 000. Thus, the LSB bit of all rotary position data is fixed at 0.0001 degrees of angle.

See also the functional description: "Display Format of Position Data".

S-0-0079 - Attributes

Para. Name:	**DE**	Rotations-Lageauflösung		
	EN	Rotational position resolution		
	FR	Résolution de position rotationnelle		
	ES	Resolución de posición de rotación		
	IT	Risoluzione per Posizionamenti circolari		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0080, Torque/Force command

If the velocity controller is active, the torque required for the corresponding velocity can be derived from this parameter.

The evaluation depends upon the scaling of the torque and force data. At present, only the **percentage-based scaling** is supported.

The date value corresponds to the current command value in respect to the motor current at standstill (S-0-0111).

100 % = Motor continous standstill torque, Mdn

The value can be converted to a torque or force value by multiplying the command current by the torque/force constant (P-0-0051).

See also the functional description: "Torque Control".

S-0-0080 - Attributes

Para. Name:	**DE**	Drehmoment/Kraft-Sollwert
	EN	Torque/Force command
	FR	Valeur de commande de couple/force
	ES	Valor nominal de par de giro/fuerza
	IT	Comando Coppia/Forza

Function:	Parameter	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	no
Unit:	S-0-0086	**Extrem value check:**	yes
Decimal places:	S-0-0086	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0084, Torque/Force feedback value

The current torque/force feedback value can be derived from this parameter.

The shown values depend from the torque/force scaling. At present, only the percentage-based scaling is supported.

The data value corresponds to the measured feedback current; 100% are equal to the motor current at standstill, S-0-0111.

The value can be converted to a torque or force value by multiplying the command current by the torque/force constant P-0-0051.

S-0-0084 - Attributes

Para. Name:	**DE**	Drehmoment/Kraft-Istwert
	EN	Torque/Force feedback value
	FR	Valeur de retour de couple/force
	ES	Par de giro/valor de retroalimentación de fuerza
	IT	Valore di Feedback Coppia/Forza

Function:	Parameter	**Editability:**	no
Data length:	2Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	no
Unit:	S-0-0086	**Extrem value check:**	no
Decimal places:	S-0-0086	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0085, Torque/Force polarity parameter

The polarities for the given torque data as related to the application can be switched in this parameter.

Polarities are switched externally, at the input and output of a control system rather than inside the system.

The following applies to rotary (turning) motors:

The motor will turn in a clockwise direction (facing the motor shaft) with a positive torque command value and positive polarity.

The following applies to linear motors:

The positive direction is used when the primary is moving toward the linear motor power cable side

Structure of the parameter:

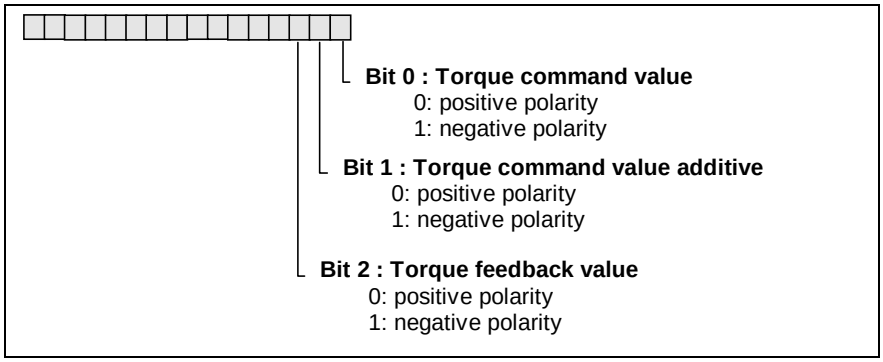
Bit 0 : Torque command value
0: positive polarity
1: negative polarity
Bit 1 : Torque command value additive
0: positive polarity
1: negative polarity
Bit 2 : Torque feedback value
0: positive polarity
1: negative polarity

Fig. 2-13: S-0-0085, Torque/force polarity parameter

Note: If bit 0 of the control system is changed, then bits 1 - 2 of the drive will also be set to the value in bit 0.

See also the functional description: "Command polarities and actual value polarities".

S-0-0085 - Attributes

Para. Name:	**DE**	Drehmoment/Kraft-Polaritäten-Parameter		
	EN	Torque/Force polarity parameter		
	FR	Paramètre de polarité de couple/force		
	ES	Par de giro/fuerza parámetro de polaridad		
	IT	Polarità Coppia/Forza		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0086, Torque/Force data scaling type

At present, only the percentage scaling for torque/force data is supported.

The following applies:

100 % = S-0-0111, Motor current at standstill

See also the functional description: "Adjustable scaling for position, velocity, and acceleration data".

S-0-0086 - Attributes

Para. Name:	**DE**	Wichtungsart für Drehmoment/Kraftdaten
	EN	Torque/Force data scaling type
	FR	Type de calibrage pour données de couple/force
	ES	Par de giro/fuerza tipo de escala de datos
	IT	Tipo di Scala per Dati Coppia/Forza

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	yes
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0091, Bipolar velocity limit value

The "bipolar velocity limit value" describes the maximum permissible velocity, symmetrical in both directions. The max. input value is determined by the **S-0-0113, Maximum motor speed (nmax)**.

The entered value generates the maximum value for all other speed parameters.

See also the functional description: "Limiting Velocity"

S-0-0091 - Attributes

Para. Name:	**DE**	Geschwindigkeits-Grenzwert bipolar
	EN	Bipolar velocity limit value
	FR	Limite de vitesse bipolaire
	ES	Valor limite de velocidad bipolar
	IT	Valore di Velocità Limite

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	S-0-0044	**Extrem value check:**	yes
Decimal places:	S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0092, Bipolar torque/force limit value

This parameter describes the maximum allowable torque symmetrical in both directions (accelerating, braking).

The evaluation refers to the percentage of the motor current at standstill:

100 % = Motor current at standstill

Note: The maximum torque is also influenced by
- P-0-0006, Overload factor
- P-0-4011, Switching frequency

See also the functional description: "Torque/Force Limiting".

S-0-0092 - Attributes

Para. Name:	**DE**	Drehmoment/Kraft-Grenzwert bipolar
	EN	Bipolar torque/force limit value
	FR	Limite de couple/force bipolaire
	ES	Valor limite par de giro/fuerza bipolar
	IT	Valore di Coppia/Forza Limite

Function:	Parameter	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	Phase3
Unit:	S-0-0086	**Extrem value check:**	yes
Decimal places:	S-0-0086	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0093, Torque/force data scaling factor

The scaling factor for all torque/force data in the drive is set in this parameter.

The parameter has no meaning at the present time, because only percentage scaling can be set for torque and force data. Therefore, only the value 1 is suitable.

See also the functional description: "Adjustable scaling for position, velocity, and acceleration data".

S-0-0093 - Attributes

Para. Name:	**DE**	Wichtungs-Faktor für Drehmoment/Kraftdaten
	EN	Torque/force data scaling factor
	FR	Facteur de calibrage pour données de couple/force
	ES	Factor de escala para datos par de giro/fuerza
	IT	Fattore di Scala per Dati Coppia/Forza

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0094, Torque/force data scaling exponent

The scaling exponent for all torque/force data in the drive is set in this parameter.

The parameter has no meaning at the present time, because only percentage scaling can be set for torque and force data.

See also the functional description: "Adjustable scaling for position, velocity, and acceleration data".

S-0-0094 - Attributes

Para. Name:	**DE**	Wichtungs-Exponent für Drehmoment/Kraftdaten
	EN	Torque/force data scaling exponent
	FR	Exposant de calibrage pour données de couple/force
	ES	Exponente de escala para datos de par de giro/fuerza
	IT	Esponente per Dati Coppia/Forza

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0095, Diagnostic message

The operating status for the drive that is relevant at the moment can be read in **text** form in this parameter.

The respective diagnostic message number from **S-0-0390, Diagnostic Message Nummer** will appear in front of this parameter.

Example: **"A010 Drive Halt"**

See also the functional description: "Diagnostic Message"

S-0-0095 - Attributes

Para. Name:	**DE**	Diagnose		
	EN	Diagnostic message		
	FR	Message de diagnostic		
	ES	Diagnostico		
	IT	Messaggio di Diagnosi		
Function:		Parameter	**Editability:**	no
Data length:		1Byte var.	**Memory:**	-
Format:		ASCII	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0097, Mask class 2 diagnostic

This parameter can be used to mask pre-warnings in **S-0-0012, Class 2 diagnostics** concerning their effect on the warning output.

A warning masked out by this mask will only be displayed in the data of the Class 2 diagnostics, but woll not lead to setting the warning output.

See also the functional description: "Sammelmeldungen".

S-0-0097 - Attributes

Para. Name:	**DE**	Maske Zustandsklasse 2		
	EN	Mask class 2 diagnostic		
	FR	Diagnostic de classe 2, masque		
	ES	Máscara diagnostico clase 2		
	IT	Maschera Diagnosi Classe 2		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0099, C500 Reset class 1 diagnostic

Command to **reset errors**, after the cause has been cleared.

This command can be started with

- the S1 key on the drive controller or
- by writing to the parameter **S-0-0099, C5 Reset class 1 diagnostic**

When starting the command via the parameter S-0-0099, all errors in the drive are cleared, and the drive will switch to the "ready for operation" status if no further error remains.

If the command is started with the S1 key, only one error is deleted at a time. If the drive has stored several errors (up to 4 errors), the diagnostic message that corresponds to each error will appear sequentially every time the S1 key is pressed again.

See also the function description: "Clearing errors".

S-0-0099 - Attributes

Para. Name:	**DE**	C500 Reset Zustandsklasse 1		
	EN	C500 Reset class 1 diagnostic		
	FR	C500 Remise à zéro pour diagnostic de classe 1		
	ES	C500 Reset diagnostico clase 1		
	IT	C500 Cancellare Errori Classe 1		
Function:		Command	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0100, Velocity loop proportional gain

This parameter contains the value for the velocity loop proportional gain.

The proportional gain **unit** depends on the contacted motor type.

Motor type:	**Unit:**
Rotary motor:	A•sec/rad
Linear motor:	A•min/m

Fig. 2-14: Units for the vel. loop prop. gain depending on the motor type

It is possible to load a default value for the parameter using the command "Basic load", as long as there is a motor with feedback memory (**P-0-4014, Motor type:** 1 or 5).

See also the functional description: "Setting the velocity controller".

S-0-0100 - Attributes

Para. Name:	**DE**	Geschwindigkeitsregler-Proportionalverstärkung
	EN	Velocity loop proportional gain
	FR	Gain proportionnel de la boucle de vitesse
	ES	Amplificación proporcional de regulador de velocidad
	IT	Guadagno proporzionale Anello di Velocità

Function:	Parameter	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	As/rad	**Extrem value check:**	yes
Decimal places:	1	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0101, Velocity loop integral action time

The velocity controller forms a current command value from the difference between the velocity command value and the velocity feedback value

(= speed regulation deviation).

This current command value consists of a proportional component and an integral component. The Velocity Loop Integral Action Time corresponds to the time in which the integral component of the current command value is growing on the value of the proportional component.

Definition of the Integral Action Time

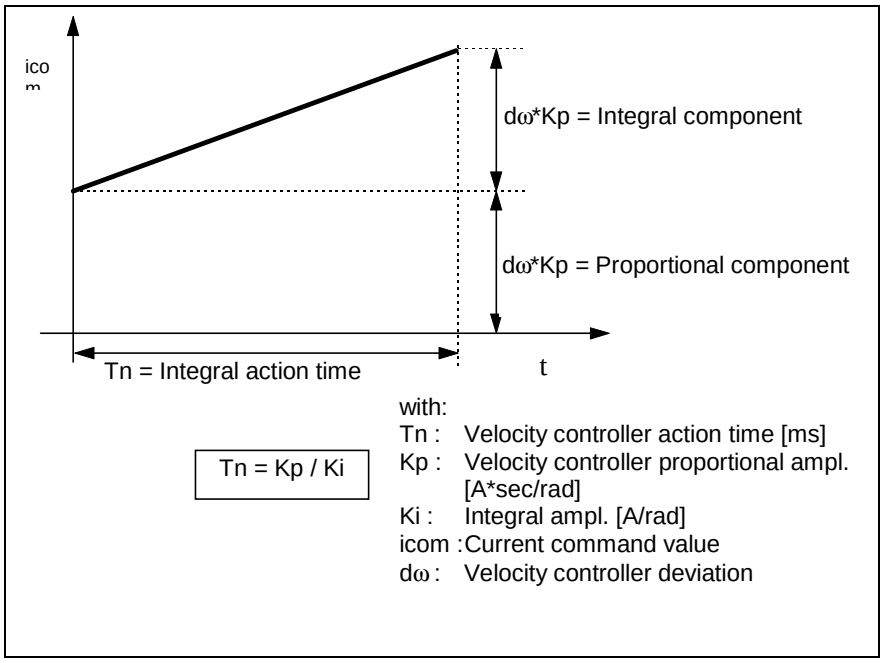
icom
dω*Kp = Integral component
dω*Kp = Proportional component
Tn = Integral action time
t
Tn = Kp / Ki
with:
Tn : Velocity controller action time [ms]
Kp : Velocity controller proportional ampl. [A*sec/rad]
Ki : Integral ampl. [A/rad]
icom : Current command value
dω : Velocity controller deviation

Fig. 2-15: Integral Action Time

The value of the time axis for which the integral component is equal to the proportional component is described as integral action time. This represents the time that a pure I-controller would need until the controller output variable is equal to the output variable of a P-controller at time t=0.

The integral gain component is disabled with an input value of 0.

See also the functional description: "Setting the velocity controller".

S-0-0101 - Attributes

Para. Name:	**DE**	Geschwindigkeitsregler-Nachstellzeit		
	EN	Velocity loop integral action time		
	FR	Temps d'action intégral de la boucle de vitesse		
	ES	Tiempo de reajuste de regulador de velocidad		
	IT	Tempo Integrazione Anello di Velocità		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		ms	**Extrem value check:**	yes
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0103, Modulo value

When the modulo format is set (parameter **S-0-0076, Position data scaling type** bit 7), the modulo value determines at which numeric value the position data roll over (overflow) to 0.

See also parameter "**S-0-0393, Command value mode**"

See also the functional description: "Modulo feature".

and "Modulo Processing-Limiting Conditions"

S-0-0103 - Attributes

Para. Name:	**DE**	Modulowert		
	EN	Modulo value		
	FR	Valeur modulo		
	ES	Valor de modulo		
	IT	Valore Modulo		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0104, Position loop Kv-factor

This parameter contains the value for the proportional gain of the position controller.

It is possible to load a default value for the controller parameters using the command "Basic load".

Motors with feedback memory e.g. MKD, have appropriate values for all controller settings in their feedback. These are loaded after the initial connection (display UL) or with the command "Basic load“.

See also the functional description: "Setting the position controller".

S-0-0104 - Attributes

Para. Name:	**DE**	Lageregler Kv-Faktor		
	EN	Position loop Kv-factor		
	FR	Gain proportionnel de la boucle de position, Kv		
	ES	Regulador de posición factor Kv		
	IT	Fattore Kv Anello di Posizione		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		1000/min	**Extrem value check:**	yes
Decimal places:		2	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0106, Current loop proportional gain 1

The current controller proportional gain is determined for every motor-drive combination. It depends on the type of the motor and may not be changed. It is loaded from the motor feedback after the initial connection (display UL) or using the command "Basic load".

Note: The values of the current controller set at the factory should not be altered!

See also function description: "Setting the Current Controller".

S-0-0106 - Attributes

Para. Name:	**DE**	Stromregler-Proportionalverstärkung 1		
	EN	Current loop proportional gain 1		
	FR	Gain proportionnel de la boucle de courant 1		
	ES	Amplificación proporcional 1 regulador de corriente		
	IT	Guadagno proporzionale 1 Regolatore di Corrente		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		V/A	**Extrem value check:**	yes
Decimal places:		2	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0107, Current loop integral action time 1

The current loop integral action time is fixed for every motor-drive combination. It depends on the type of the motor. The factory setting may not be changed.

The basic setup for all controllers is loaded after the initial connection (display UL) or with the command "Basic load“. For motors without feedback memory, you can take the value from the motor’s data sheet.

See also function description: "Setting the Current Controller".

S-0-0107 - Attributes

Para. Name:	**DE**	Stromregler-Nachstellzeit 1
	EN	Current loop integral action time 1
	FR	Temps d'action intégral de la boucle de courant 1
	ES	Tiempo de reajuste de regulador de corriente 1
	IT	Tempo Integrazione 1 Anello di Corrente

Function:	Parameter	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	ms	**Extrem value check:**	yes
Decimal places:	1	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0108, Feedrate override

The feedrate override acts on drive controlled operation modes and motion commands, like

- **S-0-0148, C600 Drive controlled homing procedure command**
- operating modes **Drive internal interpolation** and **Relative drive internal interpolation**
- Programmed **positioning block** operating mode
- **Jogging** operation
- automatic control loop setting

Note: The versions have not implemented all operating modes and commands at the same time.

The feedrate override has a **multiplying** effect on the parameters

- **S-0-0041, Homing velocity**
- **S-0-0259, Positioning velocity**
- Positioning block velocities
- Jog velocity

Note: In devices with analog interface, an analog input can be configured for the feedrate override, see also the project manual.

See also the functional description: "Drive-Controlled Homing".

S-0-0108 - Attributes

Para. Name:	**DE**	Feedrate-Override
	EN	Feedrate override
	FR	Atténuateur d'avance
	ES	Override de alimentación
	IT	Riduzione Velocità Avanzamento

Function:	Parameter	**Editability:**	P4
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	no
Unit:	%	**Extrem value check:**	no
Decimal places:	2	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0109, Motor peak current

Specifies the maximum current which may flow through the motor for a short period without damaging it.

Note: If the motor's peak current is less than the amplifier's peak current, the maximum output current will be automatically limited to the motor's peak current.

This value is stored in the motor feedback for MHD, MKD and MKE motors and will be uploaded from there when the amplifier is turned on for the first time. For other motor types, the value must be taken from the data sheet.

See also the functional description: "Setting the Active Peak Current".

S-0-0109 - Attributes

Para. Name:	**DE**	Spitzenstrom Motor		
	EN	Motor peak current		
	FR	Courant crête du moteur		
	ES	Corriente punta de motor		
	IT	Corrente di Picco Motore		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		A	**Extrem value check:**	yes
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0110, Amplifier peak current

Peak current available from the drive controller. The value will be set by the drive itself. This current is only available for short durations.

See also the functional description: "Current Limit".

S-0-0110 - Attributes

Para. Name:	**DE**	Spitzenstrom Verstärker		
	EN	Amplifier peak current		
	FR	Courant crête du variateur		
	ES	Corriente punta amplificador		
	IT	Corrente di Picco Azionamento		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		A	**Extrem value check:**	yes
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0111, Motor current at standstill

The motor current at standstill is the current from which the motor continuously generates the standstill torque according to the motor data sheet.

This value is stored in motor feedback for MHD, MKD and MKE motors and will be loaded from there when the drive controller is turned on for the first time. For other types of motors, this value must be taken from the data sheet.

Note: All torque/force data refer to this motor current at standstill = 100 % .

See also the functional description: "Motor Feedback-Data Memory"

S-0-0111 - Attributes

Para. Name:	**DE**	Stillstandsstrom Motor		
	EN	Motor current at standstill		
	FR	Courant du moteur à l'arrêt		
	ES	Corriente de parada motor		
	IT	Corrente Motore con Asse fermo		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		A	**Extrem value check:**	yes
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0112, Amplifier nominal current

Allowable continuous current output for the drive controller. The value will be set by the drive itself.

See also the functional description: "Setting the Active Continuous Current"

S-0-0112 - Attributes

Para. Name:	**DE**	Nennstrom Verstärker		
	EN	Amplifier nominal current		
	FR	Courant nominal variateur		
	ES	Corriente nominal amplificador		
	IT	Corrente nominale Azionamento		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		A	**Extrem value check:**	yes
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0113, Maximum motor speed (nmax)

The maximum velocity for the motor cannot be exceeded. It also limits the **S-0-0091, Bipolar velocity limit** parameter.

This value is stored in the motor feedback of MHD, MKD and MKE motors and will be loaded from there when the drive controller is turned on for the first time. For other motor types, the value must be taken from the data sheet.

In torque regulation, if the maximum motor speed is exceeded by more than 12.5%, the drive will be switched into a torque free state and the error message **F879 Velocity limit S-0-0091 exceeded** will result.

See also the functional description: "Limiting Velocity".

S-0-0113 - Attributes

Para. Name:	**DE**	Maximal-Geschwindigkeit des Motors		
	EN	Maximum motor speed (nmax)		
	FR	Vitesse maximale du moteur		
	ES	Velocidad máxima del motor		
	IT	Velocità massima Motore (nmax)		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0115, Position feedback 2 type

Essential characteristics of the optional encoder (position encoder 2) are established is this parameter.

Parameter structure:

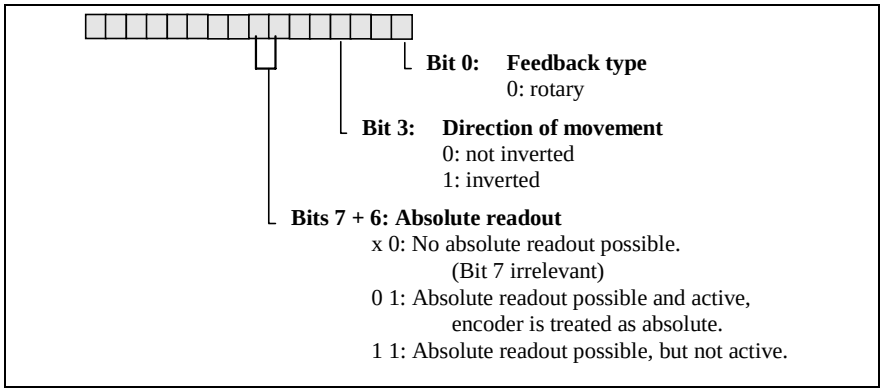
Bit 0: Feedback type
0: rotary
Bit 3: Direction of movement
0: not inverted
1: inverted
Bits 7 + 6: Absolute readout
x 0: No absolute readout possible.
(Bit 7 irrelevant)
0 1: Absolute readout possible and active,
encoder is treated as absolute.
1 1: Absolute readout possible, but not active.

Fig. 2-21: S-0-0115, Position feedback 2 type parameter

Remark:

For absolute measurement systems with data memory, bit 6 is set automatically.

Note: Only the bits indicated here are supported by the software.

See also the functional description: "Other optional Encoder Characteristics".

S-0-0115 - Attributes

Para. Name:	**DE**	Lagegeberart 2		
	EN	Position feedback 2 type		
	FR	Type codeur 2		
	ES	Tipo de encoder de posición 2		
	IT	Tipo di Feedback di Posizione 2		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0116, Feedback 1 Resolution

Depending on parameter **P-0-4014, Motor type** (rotary or linear motors), the resolution of the motor encoder is indicated by **S-0-0116, Resolution of motor feedback**.

This value contains the number of lines or cycles per motor revolution for rotary motors, or the segment spacing per mm for linear motors. For motors with resolver feedback, the number of the resolver pole pairs is stored here.

See also the functional description: "Motor encoder resolution".

S-0-0116 - Attributes

Para. Name:	**DE**	Geber 1 Auflösung		
	EN	Feedback 1 Resolution		
	FR	Résolution codeur 1		
	ES	Resolución encoder 1		
	IT	Risoluzione Feedback 1		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		Cycles/Rev	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0117, Feedback 2 Resolution

The resolution of the optional encoder contains the cycles per external encoder revolution for rotational encoders. For linear optional encoders, the segment spacing is given, in mm.

See also the functional description: "Optional Encoder Resolution".

S-0-0117 - Attributes

Para. Name:	**DE**	Geber 2 Auflösung		
	EN	Feedback 2 Resolution		
	FR	Résolution codeur 2		
	ES	Resolución encoder 2		
	IT	Risoluzione Feedback 2		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		Cycles/Rev	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0121, Input revolutions of load gear

A mechanical gear is often employed between the motor and the load.

The **gear ratio** is defined by:

$$\frac{\textbf{S-0-0122, Output Revolutions of load Gear}}{\textbf{S-0-0121, Input Revolutions of load Gear}}$$

Fig. 2-22: Gear Ratio

See also function description: "Transmission Ratio“ and "Modulo Processing-Limiting Conditions".

Example:

5 motor rotations result in 2 output gear rotations.

⇒ S-0-0121 : 5
S-0-0122 : 2

S-0-0121 - Attributes

Para. Name:	**DE**	Lastgetriebe-Eingangsumdrehungen		
	EN	Input revolutions of load gear		
	FR	Nombre de tours d'entrée d'engrenages de charge		
	ES	Giros de entrada de engranaje de carga		
	IT	N di Giri in Ingresso al Riduttore		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		Rev	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0122, Output revolutions of load gear

A mechanical gear is often employed between the motor and the load.

The gear ratio is defined by:

$$\frac{\text{S-0-0122, Output Revolutions of load Gear}}{\text{S-0-0121, Input Revolutions of load Gear}}$$

Fig. 2-23: Gear Ratio

See also function description: "Transmission Ratio" and "Modulo Processing-Limiting Conditions".

Example:

5 motor rotations result in 2 output gear rotations.

⇒ S-0-0121 : 5

S-0-0122 : 2

S-0-0122 - Attributes

Para. Name:	**DE**	Lastgetriebe-Ausgangsumdrehungen		
	EN	Output revolutions of load gear		
	FR	Nombre de tours de sortie d'engrenages de charge		
	ES	Giros de salida de engranaje de carga		
	IT	N di Giri in Uscita del Riduttore		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		Rev	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0124, Standstill window

The motors standstill is an indication that the **velocity feedback value, (S-0-0040)** has reached below the pre-define threshold level in S-0-0125.

Bit 1 of the **S-0-0013, Class 3 diagnostics** is set during standstill.

The standstill window also works:

- if termination or interruption of a drive control command is acknowledged when the drive is standing
- with drive-controlled homing, the actual and command values are not switched until the drive is standing
- command value processing is initilized upon operating mode switch to velocity = 0 if actual velocity is smaller than standstill window

See also the functional description: "S-0-0182, Manufacturer class 3 diagnostic"

S-0-0124 - Attributes

Para. Name:	**DE**	Stillstandsfenster		
	EN	Standstill window		
	FR	Fenêtre d'arrêt		
	ES	Ventana de parada		
	IT	Finestra di monitorizzazione Asse fermo		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0125, Velocity threshold nx

If the **S-0-0040, Velocity feedback value** falls below the value of the parameter **S-0-0125, Velocity threshold nx**, the drive sets the message n_actual < nx (Bit 2 in **S-0-0013, Class 3 Diagnostics**).

See also the functional description: "S-0-0013, Class 3 Diagnostics".

S-0-0125 - Attributes

Para. Name:	**DE**	Geschwindigkeits-Schwelle nx		
	EN	Velocity threshold nx		
	FR	Seuil de vitesse nx		
	ES	Umbral de velocidad nx		
	IT	Finestra di Controllo Velocità		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0126, Torque threshold Tx

The parameter Torque threshold Mdx sets the torque from which on the drive generates the message Md >= Mdx (S-0-0333).

See also the functional description: "**S-0-0013, Class 3 Diagnostics**".

S-0-0126 - Attributes

Para. Name:	**DE**	Drehmoment-Schwelle Mdx
	EN	Torque threshold Tx
	FR	Seuil de couple Mdx
	ES	Umbral de par de giro Mdx
	IT	Finestra di Controllo Coppia

Function:	Parameter	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	Phase3
Unit:	S-0-0086	**Extrem value check:**	yes
Decimal places:	S-0-0086	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0127, C100 Communication phase 3 transition check

The command "**S-0-0127, C100 Communication phase 3 transition check** is used to switch form the parameteri mode to the operating mode.

If invalid parameters are pending, then

- the drive completes the command with an error message
- and the invalid parameters are entered in parameter S-0-0021, IDN list of invalid operating data phase 2!

Note: The execution of the command also causes the switch into phase 3 but only if (P-0-4086 = xx1b) command communications (SERCOS or fieldbus) is inactive.

This makes it possible, using commands

- **S-0-0127, C100 communications phase 3 transition check**
- **S-0-0128, C200 communications phase 4 transition check**

to switch (with inactive command communications (P-0-4086 = xx**1**b)) from **Parametrization** into **operating** mode.

See also Function description: "Position Command Value Monitoring".

S-0-0127 - Attributes

Para. Name:	**DE**	C100 Umschaltvorbereitung auf Komm.-Phase 3
	EN	C100 Communication phase 3 transition check
	FR	C100 Préparation transition phase de comm. 3
	ES	C100 Comprobación de conmutación a fase 3
	IT	C100 Check Transizione Fase di Comunicazione 3

Function:	Command	**Editability:**	P2
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	no
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0128, C200 Communication phase 4 transition check

When the **S-0-0128, C200 Communication phase 4 transition check** command is executed , all parameters will be checked for validity and limit value encroachments.

- If any invalid parameters or any limit values have been encroached upon, the drive would end the command with an error message
- and the invalid parameter entered in parameter S-0-0022, IDN list of invalid operating data phase 3!

The execution of the command, however, with an **inactive** (P-0-4086 = xx**1**b) **command communication** (SERCOS or fieldbus) also causes **a transition to phase4**.

this means it possible, using commands

- **S-0-0127, C100 Communication phase 3 transition check**
- **S-0-0128, C200 Communication phase 4 transition check**

to switch from **parametrization into operating mode** with an active command communications (P-0-4086 = xx**1**b).

See also Function description: "Position Command Value Monitoring".

S-0-0128 - Attributes

Para. Name:	**DE**	C200 Umschaltvorbereitung auf Komm.-Phase 4		
	EN	C200 Communication phase 4 transition check		
	FR	C200 Préparation transition phase de comm. 4		
	ES	C200 comprobación de conmutación a fase 4		
	IT	C200 Check Transizione Fase di Comunicazione 4		
Function:		Command	**Editability:**	P3
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0134, Master control word

In the master control word, you can read important control informations, like

- drive enable
- /drive halt
- Selection of the desired operation mode

These signals are given via **digital inputs** for an analog drive.

It is structured as follows:

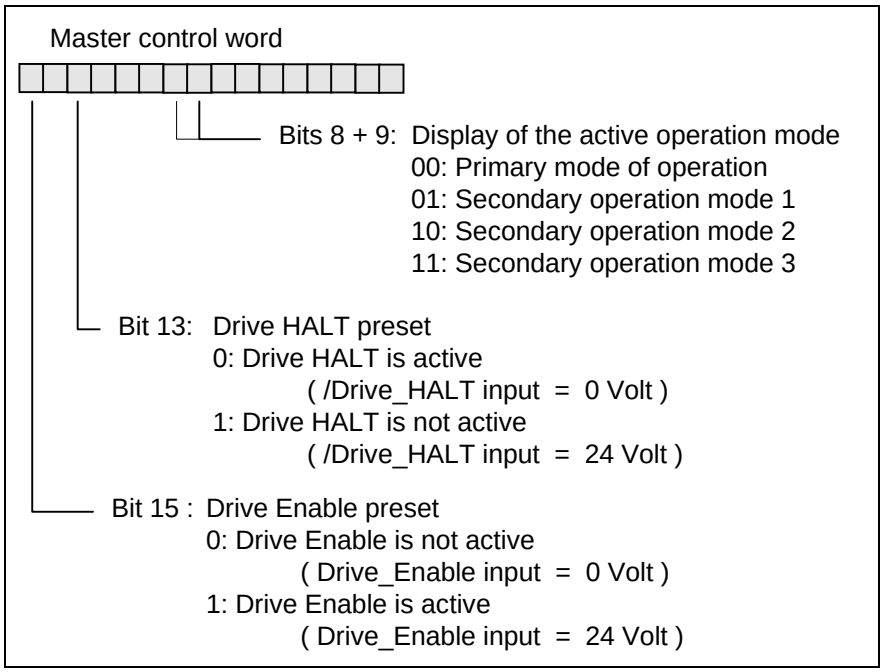
Master control word
Bits 8 + 9: Display of the active operation mode
00: Primary mode of operation
01: Secondary operation mode 1
10: Secondary operation mode 2
11: Secondary operation mode 3
Bit 13: Drive HALT preset
0: Drive HALT is active
(/Drive_HALT input = 0 Volt)
1: Drive HALT is not active
(/Drive_HALT input = 24 Volt)
Bit 15 : Drive Enable preset
0: Drive Enable is not active
(Drive_Enable input = 0 Volt)
1: Drive Enable is active
(Drive_Enable input = 24 Volt)

Fig. 2-24: Structure of the master control word

S-0-0134 - Attributes

Para. Name:	**DE**	Master-Steuerwort		
	EN	Master control word		
	FR	Mot de contrôle maître		
	ES	Palabra de mando maestro		
	IT	Word di Controllo Master		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0135, Drive status word

In the drive status word, you can read out important control informations, like

- Operation readiness of the control and power section
- Drive errors class 1
- active actual operation mode

It is structured as follows:

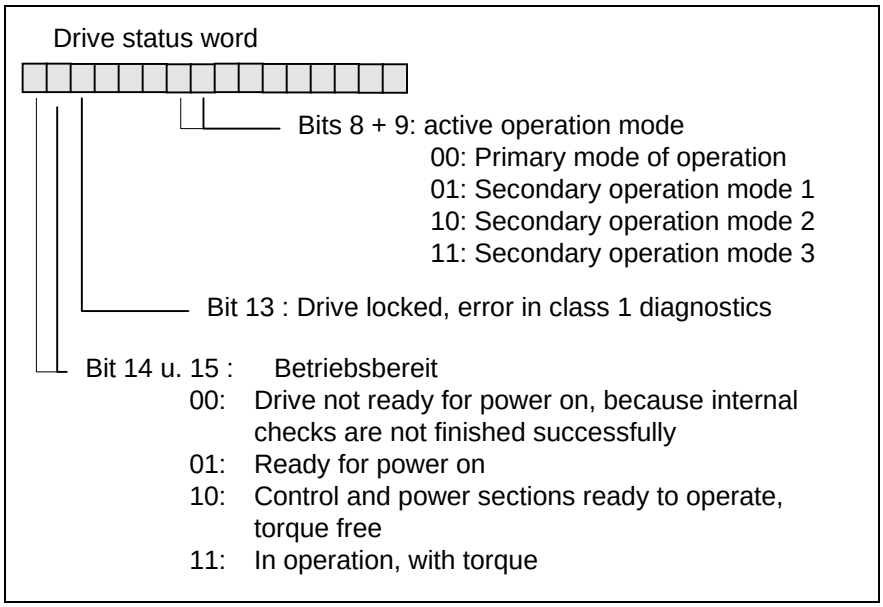
Drive status word
Bits 8 + 9: active operation mode
00: Primary mode of operation
01: Secondary operation mode 1
10: Secondary operation mode 2
11: Secondary operation mode 3
Bit 13 : Drive locked, error in class 1 diagnostics
Bit 14 u. 15 : Betriebsbereit
00: Drive not ready for power on, because internal checks are not finished successfully
01: Ready for power on
10: Control and power sections ready to operate, torque free
11: In operation, with torque

Fig. 2-25: Structure of the drive status word

S-0-0135 - Attributes

Para. Name:	**DE**	Antriebs-Status		
	EN	Drive status word		
	FR	Etat entraînement		
	ES	Estado de accionamiento		
	IT	Stato Azionamento		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0138, Bipolar acceleration limit value

The Bipolar acceleration limit value describes the maximum permissible acceleration, symmetrical in both directions (acceleration and deceleration).

The drive decelerates at this deceleration to the velocity = 0 when the function "Drive stop" is executed, if the previously active operation mode was without drive internal command generation. Operation modes without drive internal command generation are

- Position control
- Angular synchronization
- Stepper motor operation

and others.

See also the functional description: "Drive Halt".

S-0-0138 - Attributes

Para. Name:	**DE**	Beschleunigung bipolar		
	EN	Bipolar acceleration limit value		
	FR	Accélération bipolaire		
	ES	Aceleración bipolar		
	IT	Valore di Accellerazione Limite		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		S-0-0160	**Extrem value check:**	yes
Decimal places:		S-0-0161/S-0-0162	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0139, D700 Command Parking axis

Setting and enabling the command Parking Axis switches off all the monitoring functions related to the measurement system.

This affects position control, feedback monitoring and the monitoring of the position window (S-0-0057).

When the command is active, the drive does not report any errors of class 1 diagnostics.

The Position feedback value status (S-0-0403) is cleared by the drive.

The command is acknowledged positive, when the mentionend surveillances are switched off.

Clearing the command switches all the mentioned surveillances on again. To refer the position feedback values to the reference point again, the drive must go to the reference again.

Structure of the parameter:

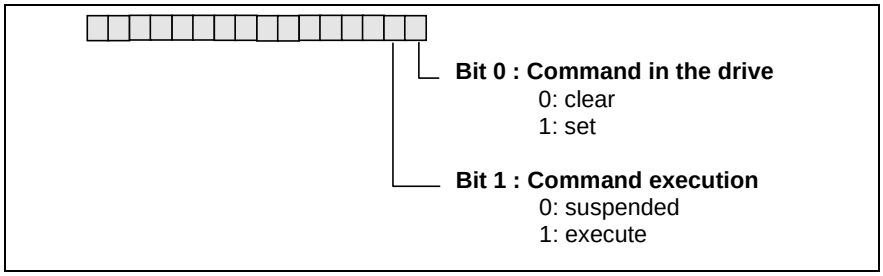

Fig. 2-26: S-0-0139, D700 Command Parking axis

See also the functional description: "Command Parking Axis".

S-0-0139 - Attributes

Para. Name:	**DE**	D700 Kommando Parkende Achse		
	EN	D700 Command Parking axis		
	FR	D700 Commande stationnement axe		
	ES	D700 Comando eje de estacionamiento		
	IT	D700 Comando Stazionamento Asse		
Function:		Command	**Editability:**	P2
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0140, Controller type

The device type of the manufacturer can be found in **text** form in the operating data for the controller type.

Examples:

HDS02.1-W100-D

DKC01.1-040-7

See also the functional description: "Drive Controllers and Motors".

S-0-0140 - Attributes

Para. Name:	**DE**	Regelgerätetyp		
	EN	Controller type		
	FR	Type de variateur		
	ES	Tipo de regulador		
	IT	Tipo Azionamento		
Function:		Parameter	**Editability:**	no
Data length:		1Byte var.	**Memory:**	-
Format:		ASCII	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0141, Motor type

Here is the motor type of the connected motor in text form.

The contents of the parametrer are overwritten when „Loading base values“ (possible with MHD, MKD and MKE motors) with parameter S-7-0141.

The diagnoses "F208 UL motor type has changed" is based on a comparison between S-0-0141 and S-7-0141.

With motors without feedback data memory it is necessary to enter the motor type.

Example:

MKD 071B-061-KP1-BN

MKE 096B-047-GG0-KN

See also the functional description: "Systemoverview".

S-0-0141 - Attributes

Para. Name:	**DE**	Motor-Typ		
	EN	Motor type		
	FR	Type de moteur		
	ES	Tipo de motor		
	IT	Tipo Motore		
Function:		Parameter	**Editability:**	P23
Data length:		1Byte var.	**Memory:**	-
Format:		ASCII	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0142, Application type

A descriptive name text for the drive can be stored in this parameter (e.g., swivel axis). It has no functional significance.

See also the functional description: "Systemoverview"

S-0-0142 - Attributes

Para. Name:	**DE**	Anwendungsart		
	EN	Application type		
	FR	Type d'application		
	ES	Tipo de aplicación		
	IT	Tipo applicazione		
Function:		Parameter	**Editability:**	P234
Data length:		1Byte var.	**Memory:**	-
Format:		ASCII	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0144, Signal status word

With the help of the signal status word, real time signals can be transferred from the drive to the PLC.

To do so, the signal status word must be configured as cyclic data in the Drive Telegram.

The bits in the signal status word can be defined freely with the parameters **S-0-0026, Configuration list signal status word** and **S-0-0328, Config. list for signal status word, bit number.**

With a parallel interface, bits 0 to 9 are illustrated directly on the digital outputs. Thus various parameters can be allocated to the digital outputs.

See also the functional description: "Configurable signal status word"

S-0-0144 - Attributes

Para. Name:	**DE**	Signal-Statuswort		
	EN	Signal status word		
	FR	Mot d'état de signal		
	ES	Palabra de estado de señal		
	IT	Parole di Stato Segnali		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0147, Homing parameter

The processes for the **S-0-0148, Drive controlled homing procedure,** in relation to the machine layout, NC and drive installation are set in this parameter.

Structure of the parameter:

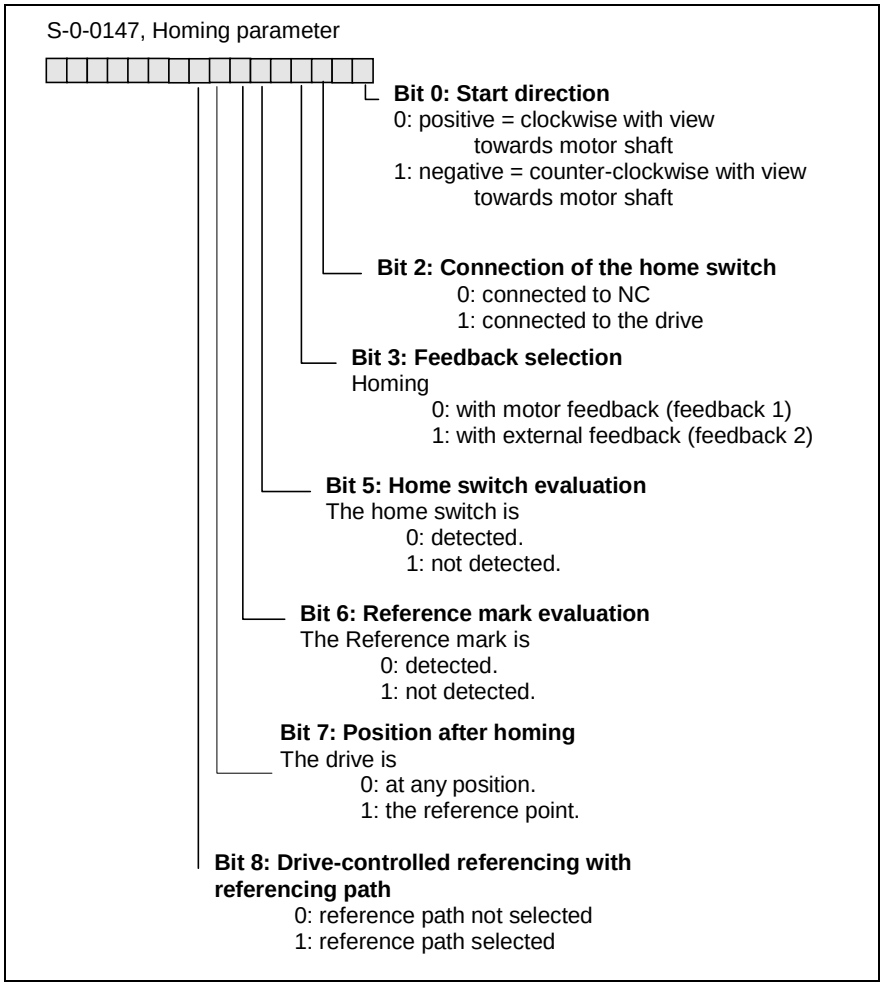
S-0-0147, Homing parameter
Bit 0: Start direction
0: positive = clockwise with view towards motor shaft
1: negative = counter-clockwise with view towards motor shaft
Bit 2: Connection of the home switch
0: connected to NC
1: connected to the drive
Bit 3: Feedback selection
Homing
0: with motor feedback (feedback 1)
1: with external feedback (feedback 2)
Bit 5: Home switch evaluation
The home switch is
0: detected.
1: not detected.
Bit 6: Reference mark evaluation
The Reference mark is
0: detected.
1: not detected.
Bit 7: Position after homing
The drive is
0: at any position.
1: the reference point.
Bit 8: Drive-controlled referencing with referencing path
0: reference path not selected
1: reference path selected

Fig. 2-1: S-0-0147, Homing Parameter

Note: In addition, for DIAX drives, bit 5 activates the monitoring of the external 24V.

See also the functional description: "Drive-controlled homing".

S-0-0147 - Attributes

Para. Name:	**DE**	Referenzfahr-Parameter		
	EN	Homing parameter		
	FR	Paramètre de prise d'origine		
	ES	Parámetro de puesta a cero		
	IT	Parametro Azzeramento		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	yes
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0148, C600 Drive controlled homing procedure command

When this command is set and enabled, the drive switches automatically into internal position control and accelerates using the **S-0-0042, Homing acceleration** to the **S-0-0042, Homing velocity** as long as it is in operating status AF. Bit 0 in **S-0-0403, Position feedback value status** will be deleted at first. As long as the command is active, changes in the cyclic position command values will be ignored.

The process for the homing procedure can be specified with **S-0-0147, Homing parameter**. After the command has been properly executed (drive is at standstill and position feedback value is related to the homing position), the drive sets bit 0 in parameter **S-0-0403, Position feedback value status**.

The parameter "Position feedback value status“ reflects the signal "In_Reference“.

See also the functional description: "Drive-controlled homing"

S-0-0148 - Attributes

Para. Name:	**DE**	C600 Kommando Antriebsgeführtes Referenzieren
	EN	C600 Drive controlled homing procedure command
	FR	C600 Commande prise origine pilotée par entraînement
	ES	C600 Comando puesta a cero por accionamiento
	IT	C600 Asse controllato durante la Procedura di Azzer.

Function:	Command	**Editability:**	P4
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	no
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0150, Reference offset 1

This parameter describes the distance between the position encoder home reference marker 1 and **S-0-0052, Reference distance 1**.

The parameter makes it possible to shift the reference point in relation to the reference marker to be detected. If bit 7 in **S-0-0147, Homing parameter** is set to 1, then, during execution of the command **S-0-0148, C600 Drive controlled homing procedure command**, the drive goes to the reference point shifted from the reference mark by the value **S-0-0150, Reference Offset 1**.

See also the functional description: "Drive-controlled homing".

S-0-0150 - Attributes

Para. Name:	**DE**	Referenzmaß Offset 1
	EN	Reference offset 1
	FR	Décalage d'origine 1
	ES	Medición de referencia offset 1
	IT	Azzeramento Offset 1 (Feedback Motore)

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	Phase3
Unit:	S-0-0076	**Extrem value check:**	yes
Decimal places:	S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0151, Reference offset 2

This parameter describes the distance between the position encoder home reference marker 2 and **S-0-0054, Reference distance 2**.

The parameter makes it possible to shift the reference point in relation to the reference marker to be detected. If bit 7 in **S-0-0147, Homing parameter** is set to 1, then, during execution of the command **S-0-0148, C600 Drive controlled homing procedure command**, the drive goes to the reference point shifted from the reference mark by the value **S-0-0151, Reference offset 2**.

See also the functional description: "Drive-controlled homing"

S-0-0151 - Attributes

Para. Name:	**DE**	Referenzmaß Offset 2		
	EN	Reference offset 2		
	FR	Décalage d'origine 2		
	ES	Medición de referencia offset 2		
	IT	Azzeramento Offset 2 (Feedback esterno)		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0152, C900 Position spindle command

When setting and enabling this command in the drive, the spindle positioning function is activated, as far as the drive delivers torque (drive enable on).

Doing this, the cyclical command values are ignored, and, taking into account the parameters

- **S-0-0138, Acceleration bipolar**
- **S-0-0154, Spindle position parameter**
- **S-0-0222, Spindle positioning speed**
- **S-0-0349, Jerk limit bipolar**

it moves to the position in **S-0-0152, C900 Position spindle command**, or it performs the distance set in **S-0-0180, Spindle relative offset**.

After execution of the spindle positioning, the message **S-0-0336, Message In position** is set, the command is **not** reported as terminated in the command acknowledge.

See also the functional description: "Spindle positioning".

S-0-0152 - Attributes

Para. Name:	**DE**	C900 Kommando Spindel positionieren		
	EN	C900 Position spindle command		
	FR	C900 Commande positionnement de broche		
	ES	C900 Comando posicionar husillo		
	IT	C900 Comando Posizionamento Mandrino		
Function:		Command	**Editability:**	P4
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	-
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0153, Spindle angle position

This parameter contains the absolute position command value for the Position spindle command (for absolute positioning).

See also the functional description: "Spindle positioning".

S-0-0153 - Attributes

Para. Name:	**DE**	Spindel-Winkelposition		
	EN	Spindle angle position		
	FR	Position angulaire de broche		
	ES	Angulo de husillo		
	IT	Angulo del Mandrino		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	P3-4
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	-
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0154, Spindle position parameter

This parameter sets options for the function "Spindle positioning".

The following are selectable in detail:

- Spindle turning right (CW)
- Spindel turning left (CCW)
- Shortest way
- absolute positioning
- relative positioning

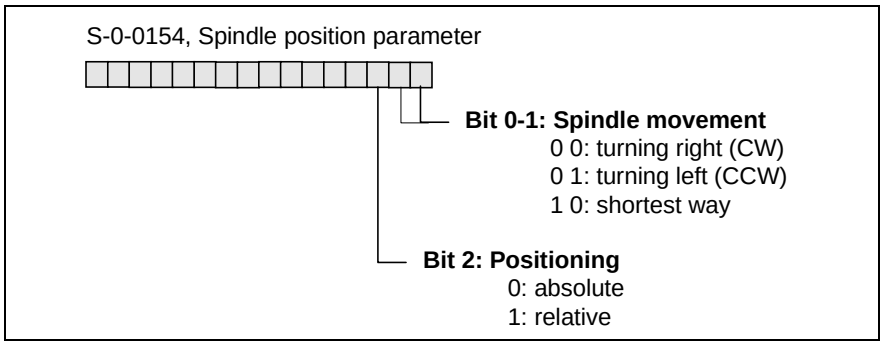

Fig. 2-1: The meaning of the bits in S-0-0154 Spindle position parameter

Spindle turning right or left / shortest way:

In **bit 0 and 1** of the parameter, the turning direction of the drive is set.

Note: The positioning direction "turning right“ or "turning left“ is only obeyed, when the spindle stands still. This is the case when it turns at a speed less than S-0-0124, Standstill window. When the Spindle moves already, the positioning is done with the actual turning direction.

Absolute / relative positioning

Bit 2 sets whether the axis goes to an angular spindle position (absolute positioning) or whether the spindle distance is performend (relative positioning).

Note: To get a reasonable result, the spindle should stay still before switching from absolute to relative positioning, in order to count the angle to move from a defined start position on. Switching over between absolute and relative positioning has an immediate effect, even during a running spindle positioning command.

The choice whether to position with motor encoder or spindle encoder is done in **S-0-0147, Homing parameter**.

See also the functional description: "Spindle positioning".

S-0-0154 - Attributes

Para. Name:	**DE**	Spindelpositionier-Parameter
	EN	Spindle position parameter
	FR	Paramètre de positionnement de broche
	ES	Parámetro de posizionamiento de husillo
	IT	Parametro Posizionamento Mandrino

Function:	Parameter	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	P3-4
Unit:	--	**Extrem value check:**	-
Decimal places:	0	**Combination check:**	yes
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0157, Velocity window

The Velocity window refers to the absolute value of the **S-0-0036, Velocity Command Value**.

If the velocity command value is whithin the calculated velocity window, then the drive sets the bit 0 in **S-0-0013, Class 3 diagnostics** (Message 'n_actual = n_command').

See also the functional description: "S-0-0013, Class 3 Diagnostics"

S-0-0157 - Attributes

Para. Name:	**DE**	Geschwindigkeits-Fenster		
	EN	Velocity window		
	FR	Fenêtre de vitesse		
	ES	Ventana de velocidad		
	IT	Finestra Velocità		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0158, Power threshold Px

The parameter Power threshold Px sets the DC bus circuit power from which on the drive generates the message P >= Px (S-0-0337).

See also the functional description: "S-0-0013, Class 3 Diagnostics".

S-0-0158 - Attributes

Para. Name:	**DE**	Leistungs-Schwelle Px		
	EN	Power threshold Px		
	FR	Seuil de puissance Px		
	ES	Umbral de potencia Px		
	IT	Soglia di Potenza Px		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	P3-4
Unit:		KW	**Extrem value check:**	yes
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0159, Monitoring window

When an operating mode with internal position control is activated in the drive, the position loop is monitored. Therefore, a model value for the actual position is calculated and compared with the real actual position.

The maximum tolerated deviation between the measured and calculated actual feedback value is set with the help of the parameter **S-0-0159, Monitoring window**. If the position deviation exceeds the monitoring window, then the drive sets the error **F228 Excessive deviation** in the class 1 diagnostics.

The greatest deviation that occurs will always be stored in parameter **P-0-0098, Max. model deviation**.

See also the functional description: "Position Control Loop Monitoring"

S-0-0159 - Attributes

Para. Name:	**DE**	Überwachungsfenster		
	EN	Monitoring window		
	FR	Fenêtre de contrôle		
	ES	Ventana de control		
	IT	Finestra di Monitoraggio		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0160, Acceleration data scaling type

Various scaling types can be set as described below for the acceleration data in the drive as defined by the bit values of this parameter.

Structure of the parameter:

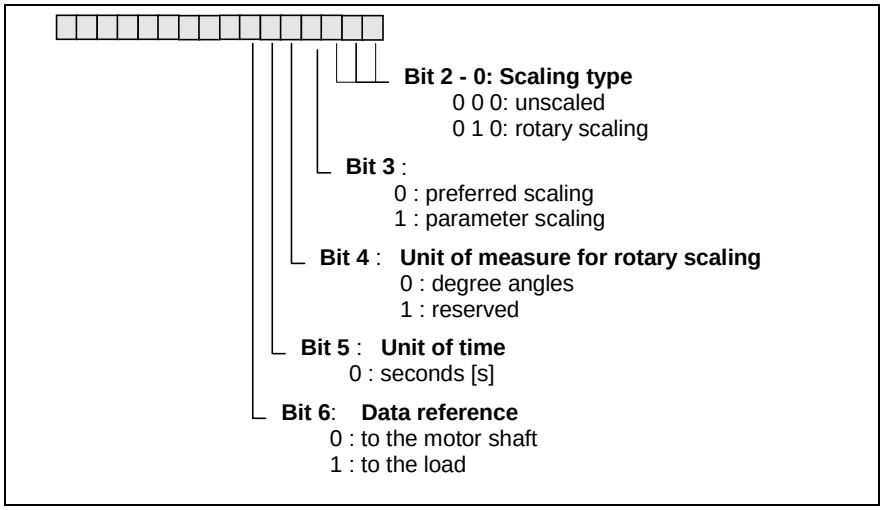
Bit 2 - 0: Scaling type
0 0 0: unscaled
0 1 0: rotary scaling
Bit 3 :
0 : preferred scaling
1 : parameter scaling
Bit 4 : Unit of measure for rotary scaling
0 : degree angles
1 : reserved
Bit 5 : Unit of time
0 : seconds [s]
Bit 6: Data reference
0 : to the motor shaft
1 : to the load

Fig. 2-2: S-0-0160, Acceleration Data Scaling Type

Note: Only the bits named here are supported by the product.

1) Same as S-0-0044 Note 1
2) Same as S-0-0044 Notes 2

see also functional description: "Velocity Data Display Format"

S-0-0160 - Attributes

Para. Name:	**DE**	Wichtungsart für Beschleunigungsdaten
	EN	Acceleration data scaling type
	FR	Type de calibrage pour données d'accélération
	ES	Tipo de escala para datos de aceleración
	IT	Tipo di Scala per Dati Accellerazione

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	yes
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0161, Acceleration data scaling factor

When parameter scaling is set in **S-0-0160, Acceleration data scaling type**, the scaling factor for all of the acceleration data in the drive is determined by this parameter.

See also the functional description: "Velocity Data Display Format".

S-0-0161 - Attributes

Para. Name:	**DE**	Wichtungs-Faktor für Beschleunigungsdaten
	EN	Acceleration data scaling factor
	FR	Facteur de calibrage pour données d'accélération
	ES	Factor de escala para datos de aceleración
	IT	Fattore di Scala per Dati Accellerazione

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0162, Acceleration data scaling exponent

If parameter scaling is set in **S-0-0160, Acceleration data scaling type** the scaling exponent with sign for all acceleration data in the drive is determined in this parameter.

See also the functional description: "Velocity Data Display Format".

S-0-0162 - Attributes

Para. Name:	**DE**	Wichtungs-Exponent für Beschleunigungsdaten
	EN	Acceleration data scaling exponent
	FR	Exposant de calibrage pour données d'accélération
	ES	Exponente de escala para datos de aceleración
	IT	Esponente per Dati Accellerazione

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0165, Distance coded reference offset 1

With the help of this parameter, the greater distance between two reference markers is programmed, if a measurement system with distance coded reference markers is used.

See also the functional description: "Drive-Controlled Homing"

S-0-0165 - Attributes

Para. Name:	**DE**	Abstandskodiertes Referenzmaß 1		
	EN	Distance coded reference offset 1		
	FR	Marques de référence de distance codée 1		
	ES	Marcas de referencia de distancia codificada 1		
	IT			
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		Periods	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0166, Distance coded reference offset 2

With the help of this parameter, the smaller distance between two reference markers is programmed, if a measurement system with distance coded reference markers is used.

See also the functional description: "Drive-Controlled Homing"

S-0-0166 - Attributes

Para. Name:	**DE**	Abstandskodiertes Referenzmaß 2		
	EN	Distance coded reference offset 2		
	FR	Marques de référence de distance codée 2		
	ES	Marcas de referencia de distancia codificada 2		
	IT			
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		Periods	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0173, Marker position A

During the drive controlled homing with an incremental measuring system, the position of the reference marker (zero pulse) is stored in this parameter. This position feedback value still refers to the "old“ coordinate system (before switching the coordinate system with the homing procedure).

Furthermore, the recognition of the reference mark can be activated by the command **P-0-0014, D500 Command determine marker position**. Then, as soon as the next reference pulse comes from the feedback, the appropriate position value is stored in this parameter, and the command gets a positive acknowledge.

See also the functional description: "Command - detect marker position"

S-0-0173 - Attributes

Para. Name:	**DE**	Markerposition A		
	EN	Marker position A		
	FR	Position du marqueur A		
	ES	Posición de marcador A		
	IT	Posizione Marca A		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		S-0-0076	**Extrem value check:**	no
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0177, Absolute distance 1

The parameter is used for the homing procedure of a distance coded motor feedback. It describes the offset between the zero point of the motor feedback (position of the 1st reference marker of the motor encoder) and the machine's zero-point.

Determining the right value for this parameter can be done in 2 steps. First, write the value 0 into S-0-0177 and proceed the command **S-0-0148, C600 Drive controlled homing procedure command**. The position feedback value 1 in S-0-0051 then shows the actual position refered to the machine’s zero point.

Then, when you jog the axis to the machine’s zero point, input the value of S-0-0051 indicated there into S-0-0177 with inverted sign (+ ↔ -). After another homing, the value in S-0-0051 displays the position in reference to the machine’s zero point.

See also the functional description: "Drive-Controlled Homing"

S-0-0177 - Attributes

Para. Name:	**DE**	Absolutmaß-Offset 1		
	EN	Absolute distance 1		
	FR	Décalage absolu 1		
	ES	Distancia absoluta 1		
	IT	Offset 1 per Dimensionamenti assoluti (Feedback Motore)		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0178, Absolute distance 2

The parameter is used for the homing procedure of a distance coded external feedback. It describes the offset between the zero point of the optional feedback (position of the 1st reference marker) and the machine's zero-point.

Determining the right value for this parameter can be done in 2 steps. First, write the value 0 into S-0-0178 and proceed the command **S-0-0148, C600 Drive controlled homing procedure command**. The position feedback value 2 in S-0-0053 then shows the actual position refered to the machine's zero point.

Then, when you jog the axis to the machine's zero point, input the value of S-0-0053 indicated there into S-0-0178 with inverted sign (+ ↔ -). After another homing, the value in S-0-0053 displays the position in reference to the machine's zero point.

See also the functional description: "Drive-Controlled Homing"

S-0-0178 - Attributes

Para. Name:	**DE**	Absolutmaß-Offset 2		
	EN	Absolute distance 2		
	FR	Décalage absolu 2		
	ES	Distancia absoluta 2		
	IT	Offset 2 per Dimensionamenti assoluti (Feedback esterno)		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0180, Spindle relative offset

This parameter contains the relative position command value for the spindle positioning (for relative positioning).

See also the functional description: "Spindle positioning".

S-0-0180 - Attributes

Para. Name:	**DE**	Spindelweg		
	EN	Spindle relative offset		
	FR	Distance relative de la broche		
	ES	Recorrido de husillo		
	IT	Distanza Mandrino		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	P3-4
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	-
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0182, Manufacturer class 3 diagnostics

Various messages regarding the operating status are stored here every 8ms. If the status of a message changes, this will not be signaled by a change bit.

Parameter structure:

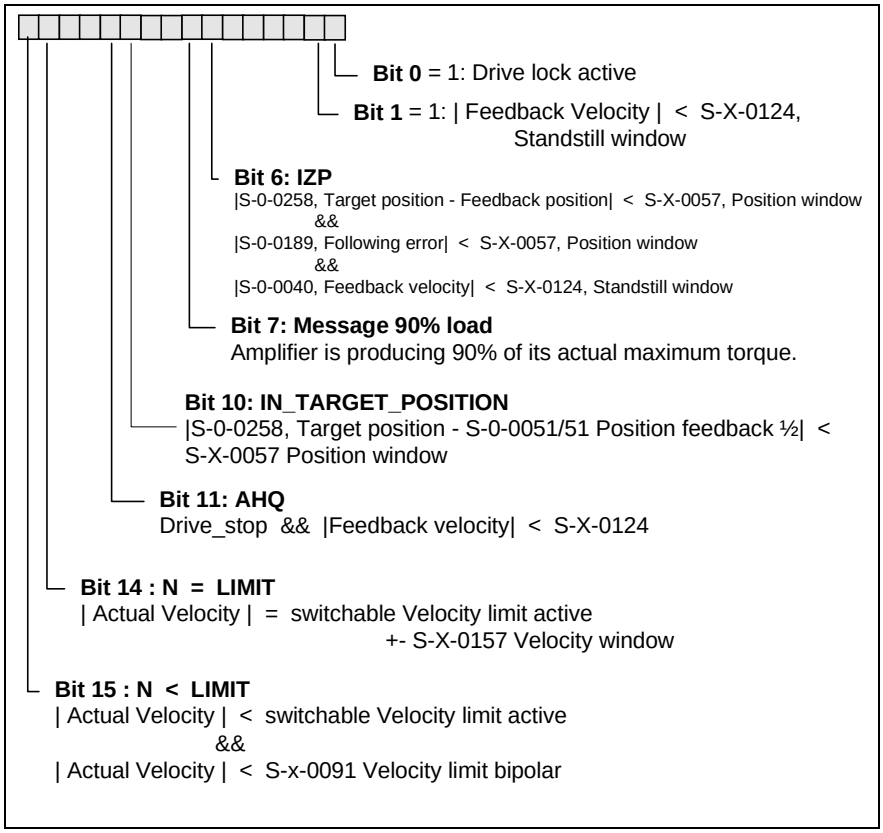
Bit 0 = 1: Drive lock active
Bit 1 = 1: | Feedback Velocity | < S-X-0124, Standstill window
Bit 6: IZP
|S-0-0258, Target position - Feedback position| < S-X-0057, Position window
&&
|S-0-0189, Following error| < S-X-0057, Position window
&&
|S-0-0040, Feedback velocity| < S-X-0124, Standstill window
Bit 7: Message 90% load
Amplifier is producing 90% of its actual maximum torque.
Bit 10: IN_TARGET_POSITION
|S-0-0258, Target position - S-0-0051/51 Position feedback ½| < S-X-0057 Position window
Bit 11: AHQ
Drive_stop && |Feedback velocity| < S-X-0124
Bit 14 : N = LIMIT
| Actual Velocity | = switchable Velocity limit active
+- S-X-0157 Velocity window
Bit 15 : N < LIMIT
| Actual Velocity | < switchable Velocity limit active
&&
| Actual Velocity | < S-x-0091 Velocity limit bipolar

Fig. 2-2: S-0-0182, Manufacturer class 3 diagnostics

Note: Only the bits indicated here are supported by the software.

See also the functional description: "S-0-0182, Manufacturer Class 3 Diagnostics".

S-0-0182 - Attributes

Para. Name:	**DE**	Hersteller-Zustandsklasse 3
	EN	Manufacturer class 3 diagnostics
	FR	Diagnostic de classe 3 spéc. au fabriquant
	ES	Diagnostico fabricante clase 3
	IT	Diagnostica Classe 3 definita dal Costruttore

Function:	Parameter	**Editability:**	no
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	no
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0189, Following error

To this parameter, the drive writes the current **difference between the position command and the feedback position** value (**S-0-0051, Position feedback 1 value** or **S-0-0053, Position feedback 2 value**).

See also the functional description: "Determining the position controller setting".

S-0-0189 - Attributes

Para. Name:	**DE**	Schleppabstand		
	EN	Following error		
	FR	Ecart de poursuite		
	ES	Error de seguimiento		
	IT	Errore di Inseguimento		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		S-0-0076	**Extrem value check:**	no
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0190, D200 Drive-controlled oscillation command

Description:

This parameter starts the function "Drive-controlled oscillation". The command is processed via the drive-internal speed control. The drive autonomously generates the velocity command path for the oscillation motion upon receipt of the command from the control.

See functional description: "Drive-controlled oscillation"

S-0-0190 - Attributes

Para. Name:	**DE**	D200 Kommando Antriebsgeführtes Pendeln		
	EN	D200 Drive-controlled oscillation command		
	FR	D200 Commande oscillations contrôlées		
	ES	D200 Comando oscilación controlada por accionamiento		
	IT	D200 Comando di Oscillazione controllata		
Function:		Command	**Editability:**	P4
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	-
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0191, D600 Cancel reference point procedure command

Setting and enabling the command Cancel reference point clears the bit **S-0-0403, Position feedback value status** in the drive.

The command correctly completed in the drive, when the bit "Position feedback value status“ has been set to 0 and the position value of the active feedback does not refer any more to the machine’s zero point (= no longer referenced).

Parameter structure:

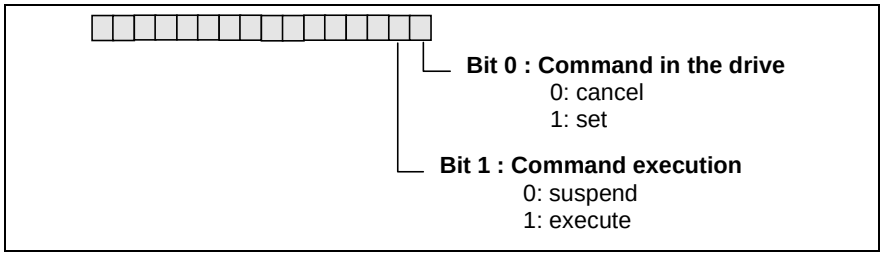

Fig. 2-3: S-0-0191, D600 Cancel reference point procedure command

See also the functional description: "Drive-Controlled Homing"

S-0-0191 - Attributes

Para. Name:	**DE**	D600 Kommando Referenzbezug löschen		
	EN	D600 Cancel reference point procedure command		
	FR	D600 Commande Annullation de l'origine		
	ES	D600 Comando Borrar referencia		
	IT	D600 Comando Anullazione Azzeramento		
Function:		Command	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0192, IDN-list of backup operation data

The ID numbers for all operating data that must be loaded in the drive for proper operation are kept in this IDN list. Generally these are the parameters which are stored in the programming module.

The control system should use this IDN list to create a **backup** copy of the drive parameters.

If a customer password has been activated with the parameter **S-0-0267, Password**, all parameters contained in **S-0-0192, IDN List of backup operation data** are write protected.

See also the functional description: "IDN List of Parameters".

S-0-0192 - Attributes

Para. Name:	**DE**	IDN-Liste der zu sichernden Betriebsdaten		
	EN	IDN-list of backup operation data		
	FR	Liste des IDN des données d'exploitation de sauvegarde		
	ES	Lista IDN de los datos de servicio de seguridad		
	IT	Lista IDN dei Dati operativi salvati		
Function:		Parameter	**Editability:**	no
Data length:		2Byte var.	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0193, Positioning Jerk

The positioning jerk limits the acceleration change per time in the operating modes with

- Drive internal interpolation and
- Relative drive internal interpolation.
- type

Note: With the value 0, the jerk filter is off.

See also the functional description: "Function principle: Drive Internal Interpolation"

S-0-0193 - Attributes

Para. Name:	**DE**	Positionier-Ruck		
	EN	Positioning Jerk		
	FR	Jerk de positionnement		
	ES	Posicionamiento agitación		
	IT	Jerk per Posizionamento		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0160	**Extrem value check:**	yes
Decimal places:		S-0-0161/S-0-0162	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0201, Motor warning temperature

If the motor temperature exceeds the motor warning temperature, then the motor warning high temperature bit will be set by the drive in **S-0-0012, Class 2 diagnostics**.

This parameter will be set by the drive at **145°** for MHD, MKD and MKE motors.

See also the functional description: "Temperature monitoring".

S-0-0201 - Attributes

Para. Name:	**DE**	Motor-Warntemperatur		
	EN	Motor warning temperature		
	FR	Température de préalerte du moteur		
	ES	Temperatura de aviso de motor		
	IT	Preallarme Temperatura Motore		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		C	**Extrem value check:**	yes
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0204, Motor shutdown temperature

If the motor temperature exceeds the motor shutdown temperature, then the motor overtemperature bit in **S-0-0011, Class 1 diagnostics** will be set by the drive and the error **F219 Motor overtemp. shutdown** will be generated.

In MHD, MKD and MKE motors, the drive sets this parameter at **155°.**

See also the functional description: "Temperature monitoring".

S-0-0204 - Attributes

Para. Name:	**DE**	Motor-Abschalttemperatur		
	EN	Motor shutdown temperature		
	FR	Température d'arrêt du moteur		
	ES	Temperatura de desconexion de motor		
	IT	Spegnimento per Sovratemp. Motore		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		C	**Extrem value check:**	yes
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0213, Oscillation speed

Description:

The oscillation speed is the amplitude of the speed oscillation in **Oscillation offset speed(S-0-0214)**.

See functional description "Drive-controlled oscillation".

S-0-0213 - Attributes

Para. Name:	**DE**	Pendel-Drehzahl		
	EN	Oscillation speed		
	FR	Vitesse pour oscillation		
	ES	Número de revoluciones de oscilación		
	IT	Velocità per Oscillazione		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	P3-4
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	-
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0214, Oscillation offset speed

Description:

The oscillation offset speed is the average speed oscillation value.

See functional description "Drive-controlled oscillation".

S-0-0214 - Attributes

Para. Name:	**DE**	Pendel-Offsetdrehzahl		
	EN	Oscillation offset speed		
	FR	Amplitude en vitesse pour oscillation		
	ES	Amplitud de velocidad de oscilación		
	IT	Ampiezza di Velocità per Oscillazione		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	P3-4
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	-
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0215, Oscillation cycle time

Description:

The oscillation cycle time of the period of oscillation of the speed of oscillation.

See functional description: "Drive-controlled oscillation".

S-0-0215 - Attributes

Para. Name:	**DE**	Pendel-Zykluszeit		
	EN	Oscillation cycle time		
	FR	Période d'oscillation		
	ES	Tiempo ciclo de oscilación		
	IT	Perioda Oscillazione		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	P3-4
Unit:		ms	**Extrem value check:**	yes
Decimal places:		1	**Combination check:**	-
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0216, D100 Switch parameter set command

Description:

This command switches the parameter set entered in **S-0-0217, Parameter set pre-select**

See functional description: "Switch parameter set".

S-0-0216 - Attributes

Para. Name:	**DE**	D100 Kommando Parametersatz umschalten
	EN	D100 Switch parameter set command
	FR	D100 Commande sélection du jeu de paramètres
	ES	D100 Comando conmutar bloque de parámetros
	IT	D100 Comando di Selezione Set Parametri

Function:	Command	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	no
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0217, Preselect parameter set command

Description:

The parameter set selected here is switched into with the command **S-0-0216, D100 Switch parameter set command**

See functional description "Switch parameter set".

S-0-0217 - Attributes

Para. Name:	**DE**	Parametersatz-Vorwahl
	EN	Preselect parameter set command
	FR	Présélection jeu de paramètres
	ES	Preselección bloque de parámetro
	IT	Preselezione Set Parametri

Function:	Parameter	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	no
Unit:	--	**Extrem value check:**	yes
Decimal places:	0	**Combination check:**	-
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0218, Gear ratio preselection

Description:

The gearstage set in parameter S-•-0218 of the activated parameter set is switched into with command **S-0-0216, d1 Switch parameter set**.

See functional description: "Automatic gear switch".

S-0-0218 - Attributes

Para. Name:	**DE**	Getriebestufen-Vorwahl
	EN	Gear ratio preselection
	FR	Présélection du rapport d'engrenages
	ES	Preselección de niveles de engranaje
	IT	Preselezione Cambiamento Riduttore

Function:	Parameter	**Editability:**	P2
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	-
Unit:	--	**Extrem value check:**	yes
Decimal places:	0	**Combination check:**	-
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0219, IDN-list of parameter set

Description:

This is a list of all parameters that can be switched in a parameter set.

See also function description "Parametersatzumschaltung".

S-0-0219 - Attributes

Para. Name:	**DE**	IDN-Liste Parametersatz		
	EN	IDN-list of parameter set		
	FR	Liste des IDN du jeu de paramètres		
	ES	Lista IDN Bloque de parámetros		
	IT	Lista IDN del Set di Parametri		
Function:		Parameter	**Editability:**	no
Data length:		2Byte var.	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0222, Spindle positioning speed

When the command for spindle positioning is executed, a moving drive decelerates down to this speed, and a standing drive can accelerate up to this max. speed, to go finally to the command position.

See also the functional description: "Spindle positioning".

S-0-0222 - Attributes

Para. Name:	**DE**	Spindel-Positionierdrehzahl		
	EN	Spindle positioning speed		
	FR	Vitesse de positionnement de broche		
	ES	Numero de revoluciones de posicionamiento de husillo		
	IT	Velocità di Posizionamento Mandrino		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	P3-4
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	-
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0254, Actual parameter set

Description:

The currently active actual parameter set is displayed here.

See functional description "Switch parameter set"

S-0-0254 - Attributes

Para. Name:	**DE**	Aktueller Parametersatz		
	EN	Actual parameter set		
	FR	Jeu de paramètres actuel		
	ES	Lista IDN bloque de parámetro		
	IT	Set di Parametri attuale		
Function:		Parameter	**Editability:**	-
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	-
Unit:		--	**Extrem value check:**	-
Decimal places:		0	**Combination check:**	-
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0255, Actual gear ratio

Description:

The presently active gear ratio is displayed in this parameter.

See functional description: "Automatic gear switch".

S-0-0255 - Attributes

Para. Name:	**DE**	Aktuelle Getriebestufe		
	EN	Actual gear ratio		
	FR	Rapport d'engrenages actuel		
	ES	Nivel de engranaje actual		
	IT	Stadio Riduttore attuale		
Function:		Parameter	**Editability:**	-
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	-
Unit:		--	**Extrem value check:**	-
Decimal places:		0	**Combination check:**	-
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0256, Multiplication 1

The parameter S-0-0256, Multiplication 1 determines, with which factor the signals of the motor feedback are multiplied in the drive.

The internal **resolution** for the motor encoder in the drive is calculated as follows:

S-0-0116 Resolution of motor feedback • S-0-0256 Multiplication 1

The multiplication 1 depends at first from the parameters **S-0-0278, Maximum travel range** and **S-0-0116, Resolution of motor feedback**. If there is an optional encoder, the **S-0-0257, Multiplication 2** is taken into account as well.

See also the functional description: "Setting the drive-internal position data format"

S-0-0256 - Attributes

Para. Name:	**DE**	Vervielfachung 1		
	EN	Multiplication 1		
	FR	Multiplication 1		
	ES	Multiplicación 1		
	IT	Multiplicazione 1		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0257, Multiplication 2

The parameter **S-0-0257, Multiplication 2** determines, with which factor the signals of the optional feedback are multiplied in the drive.

The internal resolution for the optional encoder in the drive is calculated as follows:

S-0-0117 Resolution of optional feedback • S-0-0257 Multiplication 2

The multiplication 2 depends on the parameters **S-0-0278, Maximum travel range** and **S-0-0117, Resolution of optional feedback**.

See also the functional description: "Setting the drive-internal position data format"

S-0-0257 - Attributes

Para. Name:	**DE**	Vervielfachung 2		
	EN	Multiplication 2		
	FR	Multiplication 2		
	ES	Multiplicación 2		
	IT	Multiplicazione 2		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0258, Target position

The target position is assigned to the drive as a command value by the controller in the operating modes with drive-controlled interpolation. The drive moves to the target position taking into account **S-0-0259, Positioning Velocity**, **S-0-0260, Positioning Acceleration** and **S-0-0193, Positioning Jerk**

Note: In the operating mode "Position control with positioning interface" (process blocks), the target position of the current position block will be copied to parameter S-0-0258, target position.

See also the functional description: "Function principle: Drive Internal Interpolation"

S-0-0258 - Attributes

Para. Name:	**DE**	Zielposition		
	EN	Target position		
	FR	Position à atteindre		
	ES	Posición objeto		
	IT	Posizione da raggiungere		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0259, Positioning Velocity

The Positioning Velocity is used in the operating mode "**Drive-controlled interpolation**" to reach the **S-0-0258, Target position**.

See also the functional description: "Function principle: Drive Internal Interpolation"

S-0-0259 - Attributes

Para. Name:	**DE**	Positionier-Geschwindigkeit		
	EN	Positioning Velocity		
	FR	Vitesse de positionnement		
	ES	Velocidad de posicionamiento		
	IT	Velocità di Posizionamento		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0260, Positioning Acceleration

The Positioning acceleration is used in the operating mode "**Drive-controlled interpolation**" to accelerate to the **S-0-0259, Positioning Velocity**.

See also the functional description: "Function principle: Drive Internal Interpolation"

S-0-0260 - Attributes

Para. Name:	**DE**	Positionier-Beschleunigung		
	EN	Positioning Acceleration		
	FR	Accélération de positionnement		
	ES	Aceleración de posicionamiento		
	IT	Accellerazione per Posizionamento		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0160	**Extrem value check:**	yes
Decimal places:		S-0-0161/S-0-0162	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0262, C700 Command basic load

When this command is set and enabled, the default parameters in the motor feedback for current, velocity and position control loop settings will be loaded and activated. These default parameters are not optimized for the specific application. They establish a stable control loop status.

ATTENTION

⇒ When this command is executed, parameters that have already been optimized may be overwritten.

See also Function description: "Load Default Feature"

S-0-0262 - Attributes

Para. Name:	**DE**	C700 Kommando Urladen		
	EN	C700 Command basic load		
	FR	C700 Commande chargement initial		
	ES	C700 Comando carga base		
	IT	C700 Comando Caricamento Base		
Function:		Command	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0265, Language selection

All parameter names, units and diagnostic warning messages within the drive controller are stored in several languages. This parameter determines the output language for the text.

- 0: German
- 1: English
- 2: French
- 3: Spanish
- 4: Italian

See also the functional description: "Language selection".

S-0-0265 - Attributes

Para. Name:	**DE**	Sprach-Umschaltung		
	EN	Language selection		
	FR	Sélection de langue		
	ES	Cambio de idioma		
	IT	Selezione di Lingua		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0267, Password

With this parameter, a customer password can be activated. This is used to lock the writability of all important parameters specific for the axis. The parameters which are locked by activating the customer password, can be seen in the parameter **S-0-0192, IDN-List of backup operation data**.

The password "007" is set at the factory. This password permits write access to the parameters.

Moreover, the parameter can unlock service capabilities.

See also the functional description: "Password".

S-0-0267 - Attributes

Para. Name:	**DE**	Passwort		
	EN	Password		
	FR	Mot de passe		
	ES	Contraseña		
	IT	Parola Chiave		
Function:		Parameter	**Editability:**	P234
Data length:		1Byte	**Memory:**	-
Format:		ASCII	**Validity check:**	no
Unit:			**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0269, Parameter buffer mode

The Parameter buffer mode is used to determine whether the data transmitted through the service cannel (or serial interface) will be stored temporarily (in RAM) or permanently.

1: Data will not be stored permanently. (Data are volatile.)

0: Data will be stored permanently. (Data are resident.)

After the control voltage supply has been switched on, the drive will initialize bit 0 to 0. To activate temporary storage mode, bit 0 must be forced to 1 after switching on.

Note: For applications that write cylic or frequent updates to buffered parameters: Parameter buffer mode = 1 (temporary) should be activated by the initialization procedure in the machine control. This mode ensures that the write cycle life of the EEPROM is not exceeded. Must be re-programmed after complete power shut down.

See also the functional description: "Parameters Stored in DSM Programming Module"

S-0-0269 - Attributes

Para. Name:	**DE**	Speicherungsmodus		
	EN	Parameter buffer mode		
	FR	Mode d'enregistrement		
	ES	Modo de buffer		
	IT	Buffer Modo Parametri		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0277, Position feedback 1 type

This parameter is used to determine the significant properties of the encoder 1.

Parameter structure:

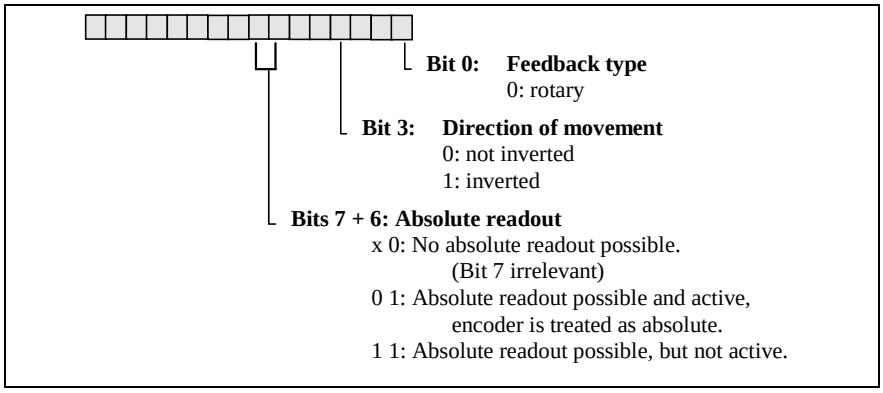
Bit 0: Feedback type
0: rotary
Bit 3: Direction of movement
0: not inverted
1: inverted
Bits 7 + 6: Absolute readout
x 0: No absolute readout possible.
(Bit 7 irrelevant)
0 1: Absolute readout possible and active,
encoder is treated as absolute.
1 1: Absolute readout possible, but not active.

Fig. 2-4: S-0-0277, Position feedback 1 type parameter

Remark:

For absolute measurement systems with data memory, bit 6 is set automatically.

When MHD-, MKD and MKE motors are used, bits 0, 1, and 3 are set and write-protected by the drive.

Note: Only the bits indicated here are supported by the software.

See also the functional description: "Other Motor Encoder Characteristics"

S-0-0277 - Attributes

Para. Name:	**DE**	Lagegeberart 1		
	EN	Position feedback 1 type		
	FR	Type codeur 1		
	ES	Tipo de encoder de posición 1		
	IT	Tipo di Feedback Posizione 1		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	yes
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0278, Maximum travel range

The parameter **S-0-0278, Maximum travel range** defines the maximum possible mechanical move of the machine. Depending on the selected scaling, modulo or absolute format (see also **S-0-0076, Position data scaling type**), the input is unipolar (positive only) or bipolar (with sign).

The parameter **S-0-0278, Maximum travel range** affects the parameters **S-0-0256, Multiplication 1** and **S-0-0257, Multiplication 2** and therefore the internal position resolution in the drive.

Moreover, the limits for velocity and acceleration of the drive internal position command generator are influenced by the maximum travel range. Among others, the max. input values for **S-0-0259, Positioning Velocity** and **S-0-0260, Positioning Acceleration** depend from the value in S-0-0278 !

Note: The greater the parametrized maximum travel range, the smaller is the multiplication and the drive internal position resolution and the higher are the limits of the acceleration and velocity data.

Additionally, the parameter **S-0-0278, Maximum travel range** affects the bit 6 "Absolute readout possible“ in the respective parameter **S-0-0277, Position feedback 1 type** or **S-0-0115, Position feedback 2 type**. If the parametrized maximum travel range is greater than the absolute numerical range of the used encoder, then the bit 6 for "Absolute readout possible“ is reset to 0. Vice versa, the bit 6 is set as soon as a travel range less than the absolute numerical range of the encoder is recognized.

See also the functional description: "Setting the drive-internal position data format"

S-0-0278 - Attributes

Para. Name:	**DE**	Maximaler Verfahrbereich
	EN	Maximum travel range
	FR	Champs de déplacement maxi.
	ES	Campo máximo de desplazamiento
	IT	Campo di Movimento mass.

Function:	Parameter	**Editability:**	P23
Data length:	4Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	Phase3
Unit:	S-0-0076	**Extrem value check:**	no
Decimal places:	S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0282, Travel distance

The control gives to the drive the travel distance in the operating mode **Relative internal Interpolation** as a **relative command value**.

When the parameter **S-0-0346, Setup flag for relative command values** is toggled (= changed), the drive adds the travel distance to the target position. The resulting absolute target position is displayed in in the parameter **S-0-0258, Target position**. Then, the drive performs the travel distance, with regard to

- **S-0-0259, Positioning Velocity**
- **S-0-0260, Positioning Acceleration**
- **S-0-0193, Positioning Jerk**

See also the functional description: "Mode: Relative drive-internal interpolation"

S-0-0282 - Attributes

Para. Name:	**DE**	Verfahrweg
	EN	Travel distance
	FR	Distance à parcourir
	ES	Recorrido de desplazamiento
	IT	Distanza Movimento

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	no
Unit:	S-0-0076	**Extrem value check:**	yes
Decimal places:	S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0292, List of all operating modes

In this list, all operation modes are named, which the drive supports. The operation modes are listed by their codings, as they are input in the parameters **S-0-0032..35** (primary and secondary operation modes).

See also the functional description: "Possible Operating Modes".

S-0-0292 - Attributes

Para. Name:	**DE**	Liste der unterstützten Betriebsarten
	EN	List of all operating modes
	FR	Liste de tous les modes de fonctionnement
	ES	Lista de todos los modos de operación
	IT	Lista di tutti i Modi operativi

Function:	Parameter	**Editability:**	no
Data length:	2Byte var.	**Memory:**	-
Format:	HEX	**Validity check:**	no
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0328, Assign list signal status word

The signal status word (S-0-0144) is configured with the parameters **S-0-0026, Configuration list signal status word** and **S-0-0328, Assign list signal status word**. These parameters have variable length with data elements of 16 bits. In the parameter **S-0-0026, Configuration list signal status word**, the **ident number** of the parameters is set, which contains the original bit (source). The parameter **S-0-0026, Configuration list signal status** determines, which **bit** in the data is copied into the signal status word.

The position in the respective configuration list determines, to which position in the signal status word the chosen bit is copied.

See also the functional description: "Configurable signal status word".

S-0-0328 - Attributes

Para. Name:	**DE**	Zuweisungsliste Signal-Statuswort
	EN	Assign list signal status word
	FR	Liste d'assignations pour mot de statut des signaux
	ES	Lista de assignaciones palabra de estado de señal
	IT	Lista di Assignazioni Parole di Stato Segnali

Function:	Parameter	**Editability:**	P234
Data length:	2Byte var.	**Memory:**	-
Format:	DEC_OV	**Validity check:**	P3-4
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0346, Setup flag for relative command values

In "Positioning block mode" any toggling of bit 0 of S-0-0346 causes the selected travel block to be assumed.

When the operation mode **Relative drive-internal interpolation** is active, the drive performs the distance parametrized in **S-0-0282, Travel distance**, as soon as the bit 0 in **S-0-0346, Setup flag for relative command values** toggles (changes).

See also the functional description: "Mode: Relative drive-internal interpolation"

S-0-0346 - Attributes

Para. Name:	**DE**	Übernahme relative Sollwerte		
	EN	Setup flag for relative command values		
	FR	Drapeau pour ajouter la distance relative		
	ES	Indicador de ajuste para valores nominales relativos		
	IT	Indicatore per cambiare la Distanza relativa		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0347, Speed deviation

Parameter S-0-0347 indicates the difference between the velocity command value and the velocity feedback value in the velocity controller.

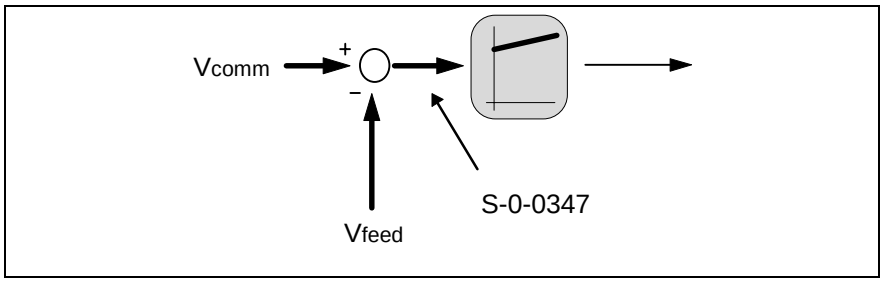

Fig. 2-5: S-0-0347, Speed deviation

See also the functional description: "Velocity controller".

S-0-0347 - Attributes

Para. Name:	**DE**	Geschwindigkeits-Regelabweichung		
	EN	Speed deviation		
	FR	Ecart de vitesse		
	ES	Desviación de velocidad		
	IT	E.I. di Velocità		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		S-0-0044	**Extrem value check:**	no
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0349, Jerk limit bipolar

The Jerk limit bipolar limits the **acceleration change per time** during "Drive Halt"

See also the functional description: "Drive Halt"

S-0-0349 - Attributes

Para. Name:	**DE**	Ruck-Grenzwert bipolar		
	EN	Jerk limit bipolar		
	FR	Limite de Jerk bipolaire		
	ES	Límite sacudida bipolar		
	IT	Limite di Jerk bipol.		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0160	**Extrem value check:**	yes
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0359, Drive internal interpolation mode

When activating the operating mode "Relative drive internal interpolation" or "Drive internal interpolation", the distance to move can refer to the actual position or to the value in parameter S-0-0258 Target position.

Structure of the parameter:

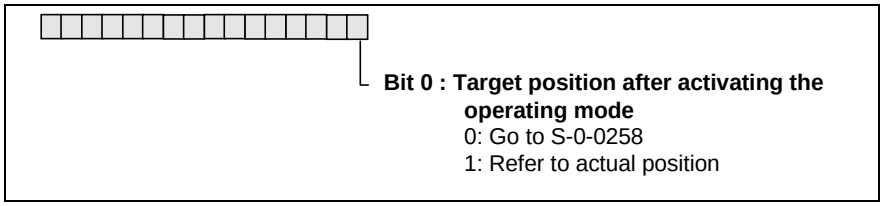

Fig. 2-6: Structure of parameter S-0-0359

Parameter S-0-0359 Drive internal interpolation, mode bit 0 = 0

After activation, the drive positions to the value in the parameter S-0-0258 Target position. Thus, after interruption of the operation mode (e.g. in case of error), the drive can go to the same target position as it should have done before the error. This means, the **residual distance** is performed.

Parameter S-0-0359 Drive internal interpolation, mode Bit 0 = 1

After activation of the operation mode, the drive refers the distance to move always to the actual position. To do this, the parameter S-0-0258 Target position is set to the actual position. This means, after an accidental interruption, the drive stays at the actual position at first.

In the operation mode Relative drive internal interpolation, the distance to move refers to the actual position after toggling the parameter S-0-0346 Setup flag for relative command values.

S-0-0359 - Attributes

Para. Name:	**DE**	Antriebsinterne Interpolation Modus		
	EN	Drive internal interpolation mode		
	FR	Mode d'interpolation interne		
	ES	Modo de interpolación interna		
	IT	Modo Interpolazione interna		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	Param.-E²prom
Format:		BIN	**Validity check:**	P3-4
Unit:		--	**Extrem value check:**	no
Decimal places:		-	**Combination check:**	no
Input min/max:		0 / 1		
Default value:		0	**Cyc. transmittable:**	no

S-0-0375, List of diagnostic numbers

The drive enters every change of the parameter **S-0-0390 Diagnostic number** in this list. The list is organized as a circular buffer; there is place for 50 numbers. When the list is read, the 1st element of the parameter shows the last displayed diagnostic number.

See also the functional description: "List of diagnostic numbers"

S-0-0375 - Attributes

Para. Name:	**DE**	Liste Diagnosenummern		
	EN	List of diagnostic numbers		
	FR	Liste des numéros de diagnostic		
	ES	Lista de numeros de diagnostico		
	IT	Lista di Numeri Diagnosi		
Function:		Parameter	**Editability:**	no
Data length:		2Byte var.	**Memory:**	no
Format:		HEX	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	no

S-0-0378, Encoder 1, absolute range

Parameter **S-0-0378 Absolute encoder 1, range** defines the range in which the encoder selected in **P-0-0074, Feedback type 1** can generate the position information absolutely.

See also the functional description: "Absolute encoder range and absolute encoder evaluation"

S-0-0378 - Attributes

Para. Name:	**DE**	Absolutbereich Geber 1
	EN	Encoder 1, absolute range
	FR	Codeur absolu 1, champs
	ES	Encoder absoluto 1, campo
	IT	Encoder assoluto 1, campo

Function:	Parameter	**Editability:**	no
Data length:	4Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	no
Unit:	S-0-0076	**Extrem value check:**	no
Decimal places:	S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0379, Encoder 2, absolute range

Description:

Parameter **S-0-0379, Absolute encoder 2, range**defines the range in which the encoder selected in **P-0-0075, Feedback type 2**can generate the position information absolutely.

See also the functional description: "Absolute encoder range and absolute encoder evaluation".

S-0-0379 - Attributes

Para. Name:	**DE**	Absolutbereich Geber 2		
	EN	Encoder 2, absolute range		
	FR	Codeur absolu 2, champs		
	ES	Encoder absoluto 2, campo		
	IT	Encoder assoluto 2, campo		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		S-0-0076	**Extrem value check:**	no
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0382, Intermediate bus power

Display of the DC-bus power in kw.

S-0-0382 - Attributes

Para. Name:	**DE**	Zwischenkreisleistung		
	EN	Intermediate bus power		
	FR	Puissance circuit interméd.		
	ES	Potencia de circuito intermedio		
	IT	Potenza sul Bus DC		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		KW	**Extrem value check:**	no
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0383, Motor temperature

This parameter contains the measured motor temperature.

Remark:

For all motors except 2AD motors, a PTC resistor is used as the temperature sensor .

As the temperature curve in this case shows a considerable tolerance and in higher temperature ranges a considerable progression, the value in
S-0-0383, Motor temperature is not usable for these motor types.

See also the functional description: "Temperature monitoring".

S-0-0383 - Attributes

Para. Name:	**DE**	Motor-Temperatur		
	EN	Motor temperature		
	FR	Température moteur		
	ES	Temperatura de motor		
	IT	Temperatura Motore		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		C	**Extrem value check:**	no
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0390, Diagnostic message number

In the parameter Diagnostic message number, the same number is stored as it can be seen in the seven segment display. This makes it possible for the control to generate its own diagnostics according to the diagnostic message number (for example in languages which are not stored as diagnostics in the drive).

Example:

Diagnostic Message: "F822 Motor encoder failure: signal too small" in parameter S-0-0095

Seven Segment Display: changing "F8" <=> "22"

Diagnostic message number: "F822(hex)" in parameter S-0-0390

See also the functional description: "Diagnostic Message Number"

S-0-0390 - Attributes

Para. Name:	**DE**	Diagnose-Nummer		
	EN	Diagnostic message number		
	FR	Numéro message diagnostique		
	ES	Numero de diagnostico		
	IT	Numero Messaggio Diagnosi		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		HEX	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0391, Monitoring window feedback 2

Description:

This parameter defines the maximum allowable deviation of the **S-0-0051, Actual feedback 1 value** and **S-0-0053, Actual feedback 2 value** .

If this value is exceeded for longer than 20ms, then the error **F236, Excessive position feedback difference** will be generated.

The monitoring can be turned off by writing 0 to this parameter.

See also the functional description: "Actual feedback value monitoring".

S-0-0391 - Attributes

Para. Name:	**DE**	Überwachungsfenster Geber 2		
	EN	Monitoring window feedback 2		
	FR	Fenêtre de surveillance du codeur 2		
	ES	Ventana de control de encoder 2		
	IT	Finestra di Controllo del Encoder 2		
Function:		Parameter	**Editability:**	P234
Data length:			**Memory:**	-
Format:			**Validity check:**	Phase3
Unit:			**Extrem value check:**	yes
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-0-0393, Command value mode

Structure of the parameter:

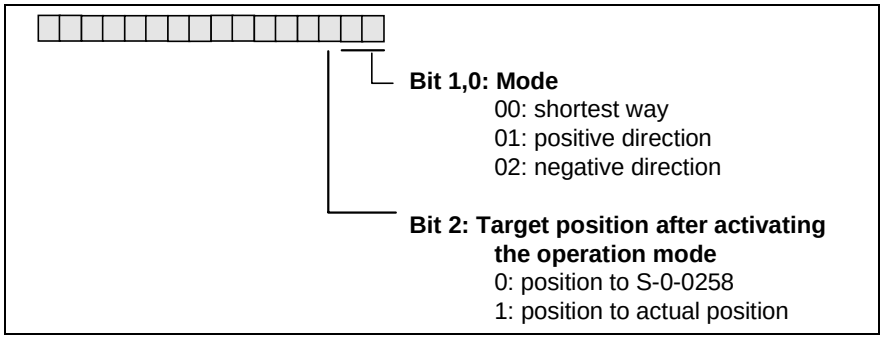
Bit 1,0: Mode
00: shortest way
01: positive direction
02: negative direction
Bit 2: Target position after activating the operation mode
0: position to S-0-0258
1: position to actual position

Fig. 2-7: Structure of the parameter S-0-0393

Description of Bit 1:

The interpretation of position command values such as **S-0-0047, Position command value** and **S-0-0258, Target position** with activated modulo function is dependent on the selected mode. To adjust the mode, there is the parameter S-0-0393.

This parameter has an effect only if **S-0-0076, Position data scaling type** has been activated in the modulo format.

Description of Bit 2:

Parameter S-0-0393, Command value mode, Bit 2 = 0

After activation, the drive positions to the value in the parameter S-0-0258 Target position. So, after an interruption of the operation mode (e.g. on error), the drive can go to the same target position as it should have done before the error. That means, the **remaining path** is performed. **Reference dimension** is retained.

Parameter S-0-0393, Command value mode, Bit 2 = 1

After activating the operation mode, the drive refers the distance to move always to the actual position. To do this, the parameter S-0-0258, Target position is set to the actual position. That means, after an accidental interruption, the drive stays at the actual position at first.

In the operation mode Relative drive internal interpolation, the distance to move refers to the actual position after toggling the parameter S-0-0346 Setup flag for relative command values. In other words, after a possible interrupt, the drive remains standing on the actual position value.

See also the functional description: "Processing Command Values in Modulo Format, Shortest Path - Direction Selection".

S-0-0393 - Attributes

Para. Name:	**DE**	Sollwertmodus
	EN	Command value mode
	FR	Mode de consigne
	ES	Modo de valor nominal
	IT	Modo per Valori comandati

Function:	Parameter	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0400, Home switch

This parameter is used to assign an ID number to the home switch (external signal).

Application:

The IDN (and thus the feedback status of the home switch) can be assigned to a real-time status bit.

Structure of the parameter:

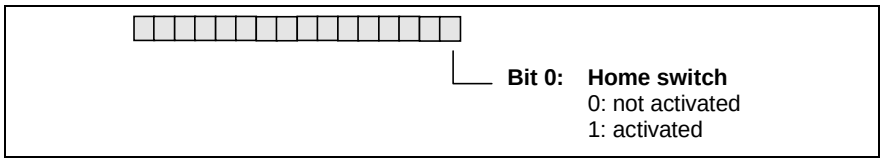

Fig. 2-8: S-0-0400, Home switch

See also the functional description: "Evaluation of the Home Switch"

S-0-0400 - Attributes

Para. Name:	**DE**	Referenzschalter
	EN	Home switch
	FR	Contact d'origine
	ES	Interruptor de referencia
	IT	FC di Zero

Function:	Parameter	**Editability:**	no
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	no
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-0-0403, Position feedback value status

When the bit 3 of **S-0-0147, Homing parameter** is set high, bit 0 of this parameter will be set high when the position feedback value is fixed in reference to the machine's zero point.

When the drive performs the commands **S-0-0148, C600 Drive controlled homing** procedure or **P-0-0012, C300 Command 'Set absolute measurement'**, the bit will be reset when they are started and then set 1 again once the command has been successfully completed.

The bit position feedback value status corresponds to the output signal "In reference".

In drives with Sercos interface, the position feedback value status can be assigned to a real-time status bit and thus be continuously communicated to the NC in the drive status word (see **S-0-0305, Allocation of real-time status bit 1**).

Structure of the parameter:

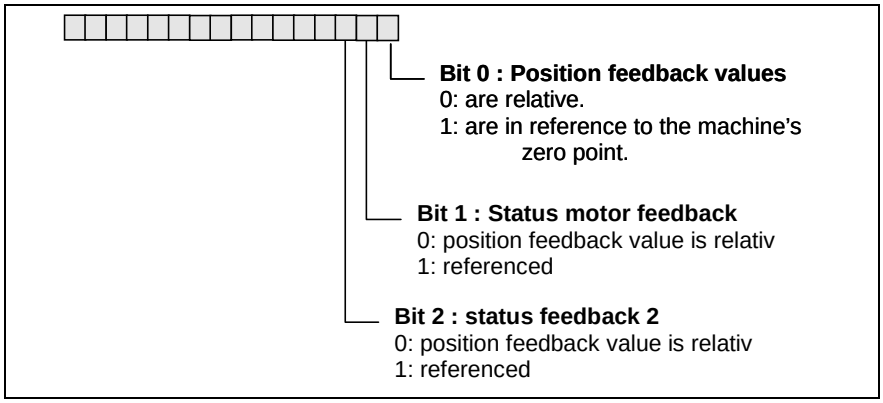
Bit 0 : Position feedback values
0: are relative.
1: are in reference to the machine's zero point.
Bit 1 : Status motor feedback
0: position feedback value is relativ
1: referenced
Bit 2 : status feedback 2
0: position feedback value is relativ
1: referenced

Fig. 2-9: S-0-0403, Position feedback value status

See also the functional description: "Drive-controlled homing".

S-0-0403 - Attributes

Para. Name:	**DE**	Status Lageistwerte		
	EN	Position feedback value status		
	FR	Etat de la valeur de retour de position		
	ES	Estado valores reales de posición		
	IT	Stato del Feedback di Posizione		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-7-0100, Velocity loop proportional gain

This parameter contains the default value for the velocity loop proportional gain.

This value comes from the feedback data memory. With the Basic Load procedure, the S-7-xxxx parameters are copied into the S-0-xxxx parameters.

Note: S-0-0100 and S-7-0100 have different units/dimensions, e.g. for rotatory action As/rad vs. mAs/rad. The number of places after the decimal also differs.

See also the functional description: "Setting the velocity controller" and the parameter description for S-0-0100.

S-7-0100 - Attributes

Para. Name:	**DE**	Geschwindigkeitsregler-Proportionalverstärkung
	EN	Velocity loop proportional gain
	FR	Gain proportionnel de la boucle de vitesse
	ES	Amplificación proporcional de regulador de velocidad
	IT	Guadagno proporzionale Anello di Velocità

Function:	Parameter	**Editability:**	no
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	mAs/rad	**Extrem value check:**	yes
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-7-0101, Velocity loop integral action time

This parameter contains the default value for the integral action time of the integrator in the velocity loop controller.

This value comes from the feedback data memory. With the Basic Load procedure, the S-7-xxxx parameters are copied into the S-0-xxxx parameters.

See also the functional description: "Setting the velocity controller" and the parameter description for S-0-0101.

S-7-0101 - Attributes

Para. Name:	**DE**	Geschwindigkeitsregler-Nachstellzeit
	EN	Velocity loop integral action time
	FR	Temps d'action intégral de la boucle de vitesse
	ES	Tiempo de reajuste de regulador de velocidad
	IT	Tempo Integrazione Anello di Velocità

Function:	Parameter	**Editability:**	no
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	ms	**Extrem value check:**	yes
Decimal places:	1	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-7-0104, Position loop Kv-factor

This parameter contains the default value for the proportional gain of the position controller.

This value comes from the feedback data memory. With the Basic Load procedure, the S-7-xxxx parameters are copied into the S-0-xxxx parameters.

See also the functional description: "Setting the position controller" and the parameter description for S-0-0104.

S-7-0104 - Attributes

Para. Name:	**DE**	Lageregler Kv-Faktor
	EN	Position loop Kv-factor
	FR	Gain proportionnel de la boucle de position, Kv
	ES	Regulador de posición factor Kv
	IT	Fattore Kv Anello di Posizione

Function:	Parameter	**Editability:**	no
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	1000/min	**Extrem value check:**	yes
Decimal places:	2	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

S-7-0106, Current loop proportional gain 1

This parameter contains the appropriate value for the proportional gain of the current controller with the connected motor.

This value comes from the feedback data memory. With the Basic Load procedure, the S-7-xxxx parameters are copied into the S-0-xxxx parameters.

Note: Do not alter the values for the current controller set at the factory.

See also function description: "Setting the Current Controller" and the parameter description for S-0-0106.

S-7-0106 - Attributes

Para. Name:	**DE**	Stromregler-Proportionalverstärkung 1		
	EN	Current loop proportional gain 1		
	FR	Gain proportionnel de la boucle de courant 1		
	ES	Amplificación proporcional 1 regulador de corriente		
	IT	Guadagno proporzionale 1 Regolatore di Corrente		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		V/A	**Extrem value check:**	yes
Decimal places:		2	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-7-0107, Current loop integral action time 1

This parameter contains the appropriate value for the integral action time of the integrator in the current controller with the connected motor.

This value comes from the feedback data memory. With the Basic Load procedure, the S-7-xxxx parameters are copied into the S-0-xxxx parameters.

Note: Do not alter the values for the current controller set at the factory.

See also function description: "Setting the Current Controller" and the parameter description for S-0-0107.

S-7-0107 - Attributes

Para. Name:	**DE**	Stromregler-Nachstellzeit 1		
	EN	Current loop integral action time 1		
	FR	Temps d'action intégral de la boucle de courant 1		
	ES	Tiempo de reajuste de regulador de corriente 1		
	IT	Tempo Integrazione 1 Anello di Corrente		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		ms	**Extrem value check:**	yes
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-7-0109, Motor peak current

Value in the feedback memory which specifies the maximum current which may flow in the motor for a short period without damaging it.

For MHD, MKD and MKE motors, the value will be copied into the active parameter **S-0-0109, Motor peak current** when the amplifier is turned on.

See also the functional description: "Setting the Active Peak Current"

S-7-0109 - Attributes

Para. Name:	**DE**	Spitzenstrom Motor		
	EN	Motor peak current		
	FR	Courant crête du moteur		
	ES	Corriente punta de motor		
	IT	Corrente di Picco Motore		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		A	**Extrem value check:**	no
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-7-0111, Motor current at standstill

Value in the feedback memory for the current which can continuously flow in the motor without damaging it.

For MHD, MKD and MKE motors, the value will be copied into the active parameter **S-0-0111, Motor current** at standstill when the amplifier is turned on.

See also the functional description: "Motor Feedback-Data Memory"

S-7-0111 - Attributes

Para. Name:	**DE**	Stillstandsstrom Motor		
	EN	Motor current at standstill		
	FR	Courant du moteur à l'arrêt		
	ES	Corriente de parada motor		
	IT	Corrente Motore con Asse fermo		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		A	**Extrem value check:**	no
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-7-0113, Maximum motor speed (nmax)

Value in the feedback memory for the maximum possible motor speed.

For MHD, MKD and MKE motors, the value will be copied into the active parameter **S-0-0113, Maximum motor speed (nmax)** when the amplifier is turned on.

See also the functional description: "Limiting Velocity".

S-7-0113 - Attributes

Para. Name:	**DE**	Maximal-Geschwindigkeit des Motors		
	EN	Maximum motor speed (nmax)		
	FR	Vitesse maximale du moteur		
	ES	Velocidad máxima del motor		
	IT	Velocità massima Motore (nmax)		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-7-0116, Feedback 1 Resolution

Value in the feedback memory for resolution of the motor encoder.

For MHD, MKD and MKE motors, the value will be copied into the active parameter **S-0-0116, Feedback 1 Resolution** when the amplifier is turned on.

See also the functional description: "Motor encoder resolution".

S-7-0116 - Attributes

Para. Name:	**DE**	Geber 1 Auflösung		
	EN	Feedback 1 Resolution		
	FR	Résolution codeur 1		
	ES	Resolución encoder 1		
	IT	Risoluzione Feedback 1		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		Cycles/Rev	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

S-7-0141, Motor type

Text in the feedback memory for the motor type.

For MHD, MKD and MKE motors, the value will be copied into the active parameter S-0-0141, Motor type when the amplifier is turned on.

The diagnostic message „F208 UL motor type has changed“ is based on a comparison between S-0-0141 and S-7-0141.

Examples:

MKD 071B-061-KP1-BN

MKE 096B-047-GG0-KN

See also the functional description: "Drive Controllers and Motors"

S-7-0141 - Attributes

Para. Name:	**DE**	Motor-Typ		
	EN	Motor type		
	FR	Type de moteur		
	ES	Tipo de motor		
	IT	Tipo Motore		
Function:		Parameter	**Editability:**	no
Data length:		1Byte var.	**Memory:**	-
Format:		ASCII	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		-	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

Notes

3 Product-specific parameters

P-0-0004, Velocity loop smoothing time constant

The time constant that can be activated in this parameter affects the output of the velocity loop controller. It can be used to suppress quantization effects and limit the bandwidth of the velocity loop controller.The limit frequency is derived from smoothing time constant T resulting from the relationship

$$f_g = \frac{1}{2 \cdot \pi \cdot \mathrm{T}}$$

Inputting the minimum input value turns the filter off.

See also the functional description: "Setting the velocity controller".

P-0-0004 - Attributes

Para. Name:	**DE**	Drehzahlregler-Glättungszeitkonstante		
	EN	Velocity loop smoothing time constant		
	FR	Temps de filtrage boucle de vitesse		
	ES	Tiempo de alisamiento n.d.r.		
	IT	Tempo di Smorzamento nell'Anello di Velocità		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		us	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0005, Language selection

All parameter names, units and diagnostic / fault messages are stored in several languages in the drive controller. The language to be used for text output is set in this parameter.

- 0 : German
- 1 : English
- 2 : French
- 3 : Spanish
- 4 : Italian

Note: Functions like S-0-0265, Language selection.

See also the functional description: "Language Selection".

P-0-0005 - Attributes

Para. Name:	**DE**	Sprach-Umschaltung		
	EN	Language selection		
	FR	Sélection de langue		
	ES	Conmutación de lengua		
	IT	Selezione Lingua		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0008, Activation E-Stop function

Parameter P-0-0008 can be used to activate the E-Stop input and to select a response for bringing the drive to standstill.

Parameter structure:

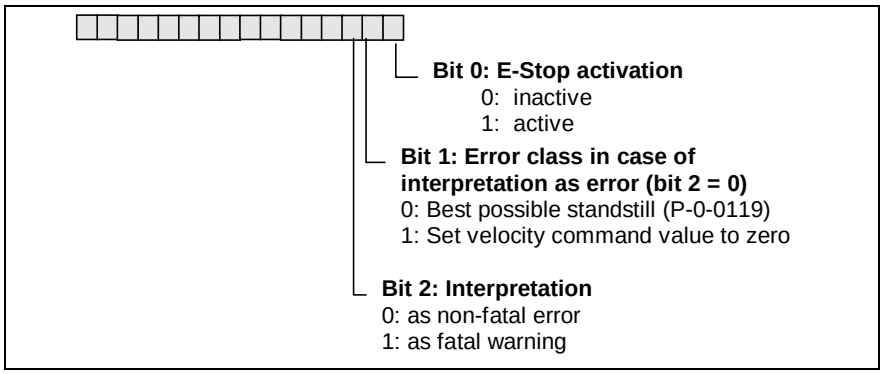
Bit 0: E-Stop activation
0: inactive
1: active
Bit 1: Error class in case of interpretation as error (bit 2 = 0)
0: Best possible standstill (P-0-0119)
1: Set velocity command value to zero
Bit 2: Interpretation
0: as non-fatal error
1: as fatal warning

Fig. 3-1: P-0-0008, Activation of E-Stop function

The input polarity is always 0-active.

Note: In addition, for DIAX devices, bit 0 activates the monitoring of the external 24V supply.

See also the functional description: "Activation and polarity of the E-Stop input".

P-0-0008 - Attributes

Para. Name:	**DE**	Aktivierung E-Stop-Funktion		
	EN	Activation E-Stop function		
	FR	Activation fonction Arrêt d'urgence		
	ES	Activación función parada de emergencia		
	IT	Attivazione della Funzione E-Stop		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	yes
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0009, Error message number

If the drive diagnosis a class 1 diagnostic error, then a bit gets in parameter **S-0-0011, Class 1 diagnostics**. Bit 13 is set in the operation status word for ‘’Error in class 1 diagnostic’’.

Additionally, for a precise diagnosis,

- the diagnosis number is displayed in the 7-segment display and stored in parameter **S-0-0390, Diagnostic message number,**
- the plain text diagnosis is stored in parameter **S-0-0095, Diagnostic message**
- and the relevant error number is stored in **paramter P-0-0009, Error message number**.

If no error is pending, then the value of parameter **P-0-0009 Error message number** is 0.

Example for a diagnostic:

S-0-0390 F822 (hex)

P-0-0009: 822 (decimal)

S-0-0095: F822 Motor encoder failure: signal too small

7-segment display: Changing between F8 and 22

See also the functional description: "Error number".

P-0-0009 - Attributes

Para. Name:	**DE**	Fehler-Nummer		
	EN	Error message number		
	FR	Numéro erreur		
	ES	Error numero		
	IT	Numero Messaggio Errore		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0010, Excessive position command value

In position control mode (S-0-0032..35 = 0x0003, 0x0004, 0x000B or 0x000C), the NC sets position commands at constant intervals (all **S-0-0001, NC Cycle time (TNcyc)**). Within the drive, the difference of two sequential position commands are monitored for excessive values, i.e., the position commands must satisfy:

$$\frac{X_{Soll}(k) - X_{Soll}(k-1)}{S-0-0001} \leq S-0-0091$$

whereby:
Xsoll(k) = NC position command in current cycle
Xsoll(k-1) = NC position command in previous cycle
S-0-0091, Bipolar velocity limit value
S-0-0001, NC Cycle time (TNcyc)

Fig. 3-2: Monitoring of the position command for excessive values for in the position control mode

If the above condition is violated, then error **F237, Excessive position command difference** is triggered and the drive decelerantes as set in parameter **P-0-0119, Best possible decleration**.

The error triggering excessive position command value ($X_{soll}(k)$)is stored in parameter **P-0-0010, Excessive position command value**, the last valid position command ($X_{soll}(k-1)$) in parameter **P-0-0011, Last valid position command value**.

See also the functional description: "Position command value monitoring".

P-0-0010 - Attributes

Para. Name:	**DE**	Exzessiver Lagesollwert		
	EN	Excessive position command value		
	FR	Consigne de position excessive		
	ES	Valor nominal de posición excesivo		
	IT	Posizione comandata eccessiva		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		S-0-0076	**Extrem value check:**	no
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0011, Last valid position command value

In position control mode (S-0-0032..35 = 0x0003, 0x0004, 0x000B or 0x000C), the NC sets position commands at constant intervals (every **S-0-0001, NC Cycle time TNcyc**). The difference of two sequential position commands is monitored for excessive value. The position command values must satisfy the following relation:

$$\frac{X_{Com}(k) - X_{Com}(k-1)}{S-0-0001} \leq S-0-0091$$

whereby:
Xcom(k) = NC-position command in current cycle
Xcom(k-1) = NC-position command in previous cycle
S-0-0091, Bipolar velocity limit value
S-0-0001, NC Cycle time (TNcyc)

Fig. 3-3: Monitoring of the position command for excessive values in the position control mode

If the above condition is violated, then error **F237, Excessive position command difference** is triggered, and the drive decelerates as set in parameter **P-0-0119, Best possible decleration**.

The error triggering excessive position command value $X_{com}(k)$ is stored in parameter **P-0-0010, Excessive position command value**, the last valid position command $X_{com}(k-1)$ in parameter **P-0-0011, Last valid position command value**.

See also the functional description: "Position command value monitoring".

P-0-0011 - Attributes

Para. Name:	**DE**	Letzter gültiger Lagesollwert		
	EN	Last valid position command value		
	FR	Dernière consigne de position valable		
	ES	Valor nominal de posición ultimo valido		
	IT	Ultima Posizione comandata valida		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		S-0-0076	**Extrem value check:**	no
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0012, C300 Command 'Set absolute measurement'

When an absolute measuring system is started for the first time, the drive will indicate a random feedback value that is not referenced to the machine zero-point.

The position feedback of this measuring system can be set to the desired value with the command "Set absolute measurement". After the "Set absolute measurement" command is executed, the position feedback value of the measurement-supplied encoder will contain a defined reference to the machine zero-point. Thereafter, the value of parameter **S-0-0403, Position feedback value status** is 1.

All information will be available after reset because all necessary data from the absolute measurement system is buffered in feedback data memory or in parameter data memory. The position feedback value permanently retains its reference to the machine zero-point.

Parameter P-0-0012 can be used to execute this function.

See also the functional description: "Set absolute measuring".

P-0-0012 - Attributes

Para. Name:	**DE**	C300 Kommando Absolutmaß setzen		
	EN	C300 Command 'Set absolute measurement'		
	FR	C300 Commande du chargement de valeur absolue		
	ES	C300 Comando Poner medición absoluta		
	IT	C300 Comando Azzeramento Encoder assoluto		
Function:		Command	**Editability:**	P4
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0014, D500 Command determine marker position

The command **P-0-0014, D500 Command determine marker position** is used to check the detection of the reference marker of an incremental measuring system. If there is an incremental measuring system and the command has been activated, then the actual position of the measuring system, once detected is stored in parameter **S-0-0173, Marker position A**. It is then signalled that the command is completed. Given 2 measuring systems,the bit 3 in **S-0-0147, Homing parameter** determines which measuring system is used.

See also the functional description: "Command - detect marker position"

P-0-0014 - Attributes

Para. Name:	**DE**	D500 Kommando Markerposition ermitteln		
	EN	D500 Command determine marker position		
	FR	D500 Commande évaluation position marqueur		
	ES	D500 Comando calcular posición de marcador		
	IT	D500 Comando prendere posizione marca		
Function:		Command	**Editability:**	P4
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0015, Memory address

This parameter can be used to select a memory address in the drive for operation-internal test purposes. The contents will be displayed in the parameter **P-0-0016, Content of memory address**.

P-0-0015 - Attributes

Para. Name:	**DE**	Speicheradresse		
	EN	Memory address		
	FR	Adresse mémoire		
	ES	Dirección de memoria		
	IT	Indirizzo Memoria		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		HEX	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0016, Content of memory address

This parameter displays the contents of the memory address set in parameter **P-0-0015, Memory address** (only for test purposes).

P-0-0016 - Attributes

Para. Name:	**DE**	Inhalt der Speicheradresse		
	EN	Content of memory address		
	FR	Contenu de l'adresse mémoire		
	ES	Contenido de la dirección de memoria		
	IT	Contesto degli Indirizzi di Memoria		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		HEX	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0018, Number of pole pairs/pole pair distance

This indicates the **number of pole pairs** per motor revolution **for rotating motors**.

For **linear motors**, the **length of a pole pair** must be indicated here.

This value does not need to be indicated here for motors with **motor feedback data memory**, like MKD.

See also the functional description: "Motor Feedback-Data Memory".

P-0-0018 - Attributes

Para. Name:	**DE**	Polpaarzahl/Polpaarweite		
	EN	Number of pole pairs/pole pair distance		
	FR	Nombre de paires de pôles/distance polaire		
	ES	Numero de par de polo/espacio de par de polo		
	IT	Numero di Coppie Poli		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		pairs of poles/mm	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0021, List of scope data 1

The measured values of channel 1 of the oscilloscope function are stored in chronological sequence in parameter **P-0-0022, List of scope data 2**. (The oldest scope value is the first element of the list.)

See also the functional description: "Oscilloscope Feature".

P-0-0021 - Attributes

Para. Name:	**DE**	Messwertliste 1		
	EN	List of scope data 1		
	FR	Liste des valeurs mesurées 1		
	ES	Lista de valor de medición 1		
	IT	Lista Misure 1		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		P-0-0023	**Validity check:**	no
Unit:		P-0-0023	**Extrem value check:**	no
Decimal places:		P-0-0023	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0022, List of scope data 2

The measured values of channel 2 of the oscilloscope function are stored in chronological sequence in parameter **P-0-0022, List of scope data 2**. (The oldest scope value is the first element of the list.)

See also the functional description: "Oscilloscope Feature".

P-0-0022 - Attributes

Para. Name:	**DE**	Messwertliste 2		
	EN	List of scope data 2		
	FR	Liste des valeurs mesurées 2		
	ES	Lista de valor de medición 2		
	IT	Lista Misure 2		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		P-0-0024	**Validity check:**	no
Unit:		P-0-0024	**Extrem value check:**	no
Decimal places:		P-0-0024	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0023, Signal select scope channel 1

Parameter P-0-0023 determines the signal that will be recorded. The following fixed predefined signals are available:

Number	Signal selection	Unit of the scope data list
0 x 00	Channel not activated	--
0 x 01	Actual feedback value dependent on operating mode S-0-0051 or S-0-0053	Dependent on position scaling
0 x 02	Velocity value parameter (S-0-0040)	Dependent on velocity scaling
0 x 03	Velocity control deviation (-S-0-0347)	Dependent on velocity scaling
0 x 04	Following error parameter (S-0-0189)	Dependent on position scaling
0 x 05	Torque/force command value parameter S-0-0080	Percent
0 x 06	Position feedback 1, S-0-0051	Dependent on position scaling
0 x 07	Position feedback 2, S-0-0053	Dependent on position scaling
0 x 08	Position command value	Dependent on position scaling

Fig. 3-4: P-0-0023, Signal select scope channel 1

Expanded oscilloscope recording feature:

In addition to the fixed predefined signal selection, it is also possible to record any memory address of the drive. To do this, bit 12 = 1 must be set. Bit 13 defines the data length of the memory signal in question.

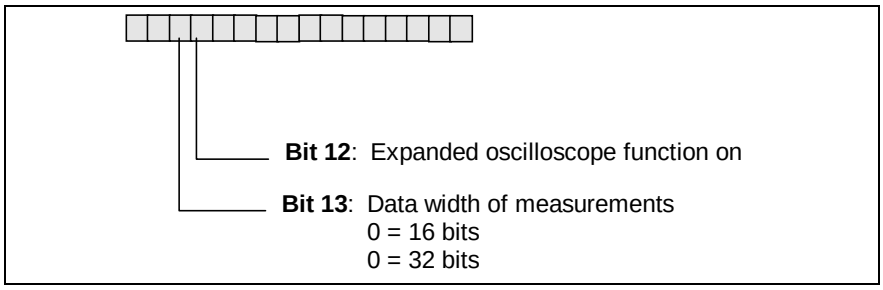

Fig. 3-5: P-0-0023 & P-0-0024, Oscilloscope function signal selection

See also the functional description: "Oscilloscope Feature".

P-0-0023 - Attributes

Para. Name:	**DE**	Signalauswahl 1 Oszilloskop-Funktion		
	EN	Signal select scope channel 1		
	FR	Fonction oscilloscope, sélection signal 1		
	ES	Selección de señal 1 función de osciloscopio		
	IT	Segnale Selezionato Canale 1		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		HEX	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0024, Signal select scope channel 2

Parameter P-0-0024 determines the signal that will be recorded. The following fixed predefined signals are available:

Number	Signal selection	Unit of the scope data list
0 x 00	Channel not activated	--
0 x 01	Actual feedback value dependent on operating mode S-0-0051 or S-0-0053	Dependent on position scaling
0 x 02	Velocity value parameter (S-0-0040)	Dependent on velocity scaling
0 x 03	Velocity control deviation (-S-0-0347)	Dependent on velocity scaling
0 x 04	Following error parameter (S-0-0189)	Dependent on position scaling
0 x 05	Torque/force command value parameter S-0-0080	Percent
0 x 06	Position feedback 1, S-0-0051	Dependent on position scaling
0 x 07	Position feedback 2, S-0-0053	Dependent on position scaling
0 x 08	Position command value	Dependent on position scaling

Fig. 3-6: P-0-0024, Signal select scope channel 2

Expanded oscilloscope recording feature:

In addition to the fixed predefined signal selection, it is also possible to record any memory address of the drive. To do this, bit 12 = 1 must be set. Bit 13 defines the data length of the memory signal in question.

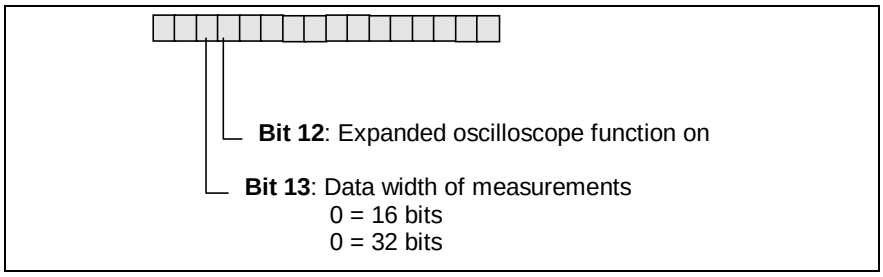

Fig. 3-7: P-0-0023, and P-0-0024, Oscilloscope function signal selection

See also the functional description: "Oscilloscope Feature".

P-0-0024 - Attributes

Para. Name:	**DE**	Signalauswahl 2 Oszilloskop-Funktion
	EN	Signal select scope channel 2
	FR	Fonction oscilloscope, sélection signal 2
	ES	Selección de señal 2 función de osciloscopio
	IT	Segnale Selezionato Canale 2

Function:	Parameter	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	HEX	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	no
Decimal places:	--	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-0025, Trigger source

Parameter P-0-0025 defines the source that initiates the trigger signal. There is a choice between

- External trigger
- Internal trigger

External trigger (P-0-0025 = 0x01)

If the external trigger is chosen, then the trigger will be initiated by bit 0 of the trigger command word.

Internal trigger (P-0-0025 = 0x02)

If the internal trigger is selected, then the trigger signal set by parameter will be monitored for the trigger condition, and the trigger will be initiated as soon as the condition is met.

See also the functional description: "Oscilloscope Feature".

P-0-0025 - Attributes

Para. Name:	**DE**	Triggerquelle Oszilloskop-Funktion		
	EN	Trigger source		
	FR	Source de déclenchement pour fonction oscilloscope		
	ES	Origen de trigger osciloscopio		
	IT	Sorgente Trigger		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0026, Trigger signal selection

For internal trigger sources, the parameter P-0-0026, Trigger signal selection defines the signal that is monitored for the parametrized trigger condition. The following fixed predefined signals are available:

Trigger signal numbers	Trigger signal	Corresponding trigger threshold
0 x 00	Not defined	Not defined
0 x 01	Actual feedback value based on mode of operation	Position data P-0-0027
0 x 02	Velocity feedback value Parameter S-0-0040	Velocity data P-0-0028
0 x 03	Velocity deviation parameter	Velocity data P-0-0028
0 x 04	Following error, parameter S-0-0189	Position data P-0-0027
0 x 05	Torque command value, parameter S-0-0080	Torque data P-0-0029
0 x 06	Position feedback 1, S-0-0051	Depending on position scaling
0 x 07	Position feedback 2, S-0-0053	Depending on position scaling
0 x 08	Position command value	Depending on position scaling

Fig. 3-8: P-0-0026, Trigger signal selection

Additional trigger signals can also be defined by setting bit 12.

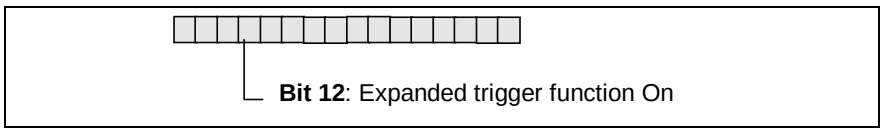

Fig. 3-9: P-0-0026, Trigger signal selection

See also the functional description: "Oscilloscope Feature".

P-0-0026 - Attributes

Para. Name:	**DE**	Triggersignalauswahl Oszilloskop-Funktion		
	EN	Trigger signal selection		
	FR	Fonction oscilloscope, sélection signal de déclenc.		
	ES	Selección de señal de trigger función osciloscopio		
	IT	Segnale di Trigger selezionato		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		HEX	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0027, Trigger level for position data

Parameter P-0-0027 determines with given **P-0-0026, Trigger signal selection** oscilloscope function = “1“or “4“, the position value at which the trigger will be released as long as the correct edge has been recognized.

See also the functional description: "Oscilloscope Feature".

P-0-0027 - Attributes

Para. Name:	**DE**	Triggerschwelle für Lagedaten		
	EN	Trigger level for position data		
	FR	Seuil de déclenchement données de position		
	ES	Umbral de trigger para datos de posición		
	IT	Livello di Trigger per Dati di Posizione		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0028, Trigger level for velocity data

Parameter P-0-0028 determines with given **P-0-0026, Trigger signal selection** oscilloscope function = “2“ or “3“, the actual speed value at which the trigger will be released as long as the correct edge has been recognized.

See also the functional description: "Oscilloscope Feature".

P-0-0028 - Attributes

Para. Name:	**DE**	Triggerschwelle für Geschwindigkeitsdaten		
	EN	Trigger level for velocity data		
	FR	Seuil de déclenchement données de vitesse		
	ES	Umbral de trigger para datos de velocidad		
	IT	Livello di Trigger per Dati di Velocità		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0029, Trigger level for torque/force data

Parameter P-0-0029 determines with given **P-0-0026, Trigger signal selection** oscilloscope function = “5“, the torque force value at which the trigger will be released as long as the correct edge has been recognized.

See also the functional description: "Oscilloscope Feature".

P-0-0029 - Attributes

Para. Name:	**DE**	Triggerschwelle für Drehmoment/Kraftdaten		
	EN	Trigger level for torque/force data		
	FR	Seuil de déclenchement données de couple/force		
	ES	Umbral de trigger para datos de par/fuerza		
	IT	Livello di Trigger per Dati Coppia/Forza		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		%	**Extrem value check:**	yes
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0030, Trigger edge

Parameter P-0-0030 Trigger edge defines the signal change at which a trigger event can be initiated.

Number:	Trigger edge:
1	Triggering on the positive edge of the trigger signal
2	Triggering on the negative edge of the trigger signal
3	Triggering on both the positive edge and negative edge of the trigger signal
4	Triggering if the trigger signal equals the trigger level

Fig. 3-10: Selection of trigger edges

See also the functional description: "Oscilloscope Feature".

P-0-0030 - Attributes

Para. Name:	**DE**	Triggerflanke		
	EN	Trigger edge		
	FR	Front de déclenchement		
	ES	Lado de trigger		
	IT	Fronte di Trigger		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0031, Timebase

The Timebase defines the time intervals in which the probe values of the selected signals are sampled. Possible time intervals range from 250 µs (resp. 500 µs) to 100 ms.

Note that in general:

Recording duration = Time resolution • Size of memory [µs]

See also the functional description: "Oscilloscope Feature".

P-0-0031 - Attributes

Para. Name:	**DE**	Zeitauflösung		
	EN	Timebase		
	FR	Base de temps		
	ES	Resolución de tiempo		
	IT	Base dei Tempi		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		us	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0032, Size of memory

The size of memory determines the number of recorded probe values per measurement. A maximum of 512 probe values can be recorded per channel.

The memory size and time resolution together determine the recording duration. The minimum recording duration is 128 ms, and the maximum duration is 51.2 s.

Note that in general:

Recording duration = Time resolution • Size of memory [us]

See also the functional description: "Oscilloscope Feature".

P-0-0032 - Attributes

Para. Name:	**DE**	Speichertiefe		
	EN	Size of memory		
	FR	Taille mémoire		
	ES	Tamaño de memoria		
	IT	Dimensione Memoria		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0033, Number of samples after trigger

Parameter P-0-0033 defines the number of probe values, or samples, that will be entered in the probe value list after the trigger event. In this way it is possible to set a parameter to define a trigger delay. Parameter P-0-0033 is used for this.

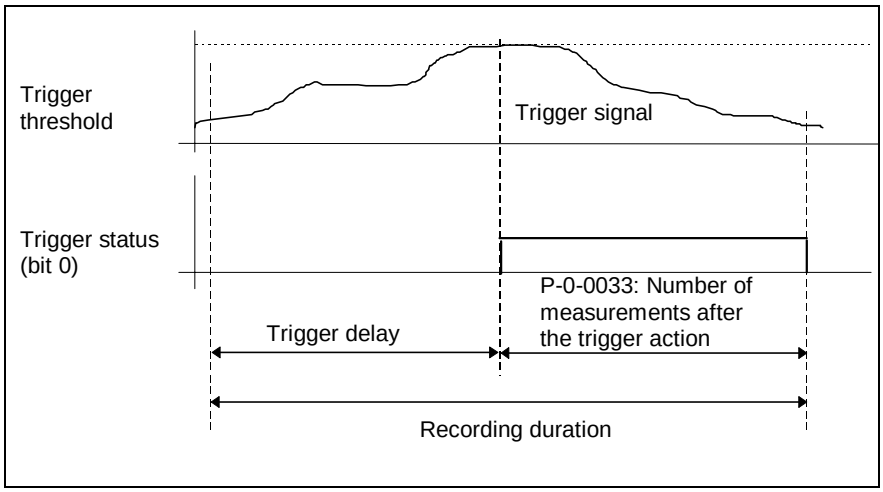

Fig. 3-11: Triggering

See also the functional description: "Oscilloscope Feature".

P-0-0033 - Attributes

Para. Name:	**DE**	Anzahl der Messwerte nach Triggerereignis		
	EN	Number of samples after trigger		
	FR	Nombre de mesures après déclenchement		
	ES	Numero de muestras despues de trigger		
	IT	Numero di Campionamenti dopo Trigger		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0035, Delay from trigger to start

Parameter P-0-0035 indicates the number of cycles between the trigger event (internal) and the release of the trigger (bit 0 trigger control word) in external triggering.

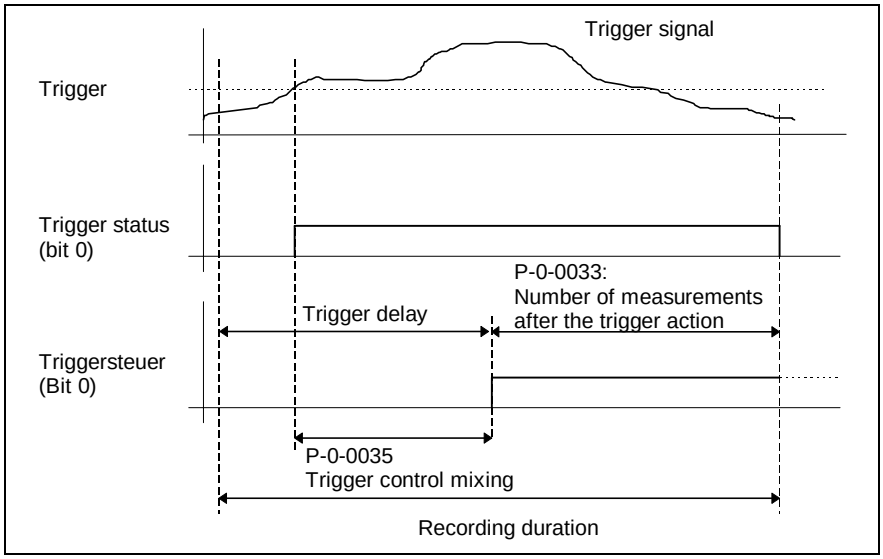

Fig. 3-12: Triggering

Since there is a delay between the transmission of the trigger event by the control system and the release of the trigger, the delay is measured by the drive controller and stored in parameter **P-0-0035, Delay from trigger to start**. A time-correct display of signals is ensured by using this parameter for visualizing the probe values.

See also the functional description: "Oscilloscope Feature".

P-0-0035 - Attributes

Para. Name:	**DE**	Triggersteuerversatz		
	EN	Delay from trigger to start		
	FR	Délai de déclenchement		
	ES	Retardo de mando de trigger		
	IT	Ritardo del Trigger dopo Start		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0036, Trigger control word

Parameter P-0-0036 controls the oscilloscope function.

- Bit 2 activates the function, i.e., the lists of scope data are filled with the selected data.
- Bit 1 activates trigger monitoring.
- Bit 0 can initiate a trigger event. If a valid edge is recognized, the probe-value memory will be completed as specified by parameter **P-0-0033, Number of samples after the trigger**, and the oscilloscope function will be deactivated by resetting bits 1 and 2 in the trigger control word.

Parameter structure:

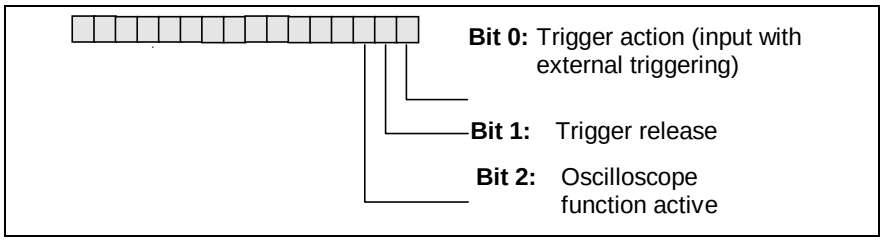

Fig. 3-13: P-0-0036, Trigger control word

See also the functional description: "Oscilloscope Feature".

P-0-0036 - Attributes

Para. Name:	**DE**	Triggersteuerwort		
	EN	Trigger control word		
	FR	Mot de commande déclenchement		
	ES	Palabra de mando de trigger		
	IT	Controllo Trigger		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		HEX	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0037, Trigger status word

Status messages for the oscilloscope function.

The parameter P-0-0037 offers various pieces of information about the current status of the oscilloscope function.

Parameter structure:

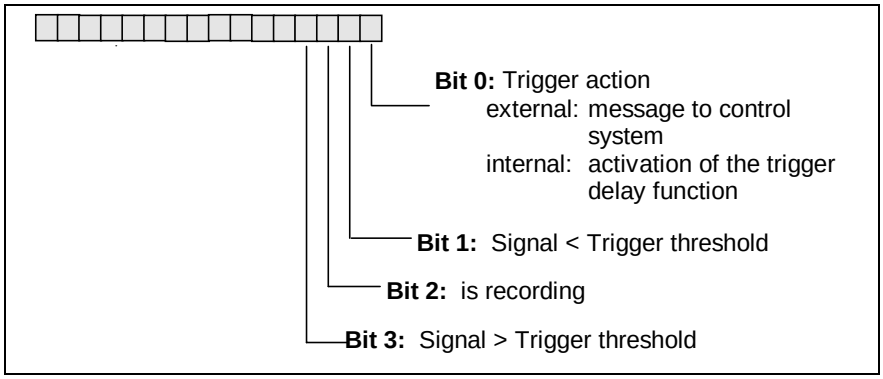

Fig. 3-14: P-0-0037, Trigger status word

See also the functional description: "Oscilloscope Feature".

P-0-0037 - Attributes

Para. Name:	**DE**	Triggerstatuswort		
	EN	Trigger status word		
	FR	Mot d'état déclenchement		
	ES	Palabra de estado de trigger		
	IT	Stato Trigger		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		HEX	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0051, Torque/force constant

The torque/force constant determines what drive torque or force the motor will deliver at a specific effective current.

For **synchronous motors**, this value depends entirely on the design of the motor.

In **asynchronous motors**, this value is valid as long as the motor is not operated in the field-weakening range.

For MHD, MKD and MKE motors, this parameter is stored in the **feedback data memory** and cannot be changed.

MA [Nm, N] = (P-0-0051)•(S-0-0111)•(S-0-0080)

where:

MA	=	Drive torque
P-0-0051	=	Torque/force constant, [Nm/A] or [N/A]
S-0-0111	=	Motor current at standstill [A]
S-0-0080	=	Torque/force command [%]

Fig. 3-15: Drive torque

See also the functional description: "Motor Feedback-Data Memory".

P-0-0051 - Attributes

Para. Name:	**DE**	Drehmoment/Kraft-Konstante		
	EN	Torque/force constant		
	FR	Constante de couple/force		
	ES	Constante de par/fuerza		
	IT	Costante di Coppia/Forza		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		Nm/A	**Extrem value check:**	no
Decimal places:		2	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0074, Feedback 1 type

This parameter determines the encoder interface to which the motor encoder is connected. The number of the corresponding interface module should be entered in this parameter.

Module:	P-0-0074:	Measurement system:
-	0	None (only with rotary asynchronous motors)
Standard	1	Digital servo feed back or resolver
DLF01.1M	2	Incremental encoder with sine signals from the Heidenhain company, with either µA or 1V signals
DZF02.1M	3	Indramat gear-type encoder
DEF01.1M	5	Incremental encoder with square-wave signals from the Heidenhain company
DAG01.2M	8	Encoder with EnDat interface from the Heidenhain company
DZF03.1M	9	Gearwheel with 1Vpp signals
Standard	10	Resolver without feedback data memory
Standard + DLF01.1M	11	Resolver without feedback data memory plus incremental encoder with sine signals

Fig. 3-16: P-0-0074, Feedback 1 type

Restrictions:

Modules DLF, DZF, DRF and DEF 1 must not be operated simultaneously in a controller. => **Danger of Damage!**

It is not possible to combine DLF and DZF.
Module DEF 2 can be used to operate an incremental encoder along with DLF or DZF.

See also the functional description: "Determining the Feedback Interface of the Motor Feedback".

P-0-0074 - Attributes

Para. Name:	**DE**	Geber-Typ 1		
	EN	Feedback 1 type		
	FR	Type de codeur 1		
	ES	Tipo de encoder 1		
	IT	Tipo di Feedback 1		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	yes
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0075, Feedback 2 type

This parameter determines the encoder interface to which the external encoder is connected. The number of the corresponding interface module should be entered in this parameter.

Module:	P-0-0075:	Measurement system:
--	0	None
Standard	1	Digital servo feedback
DLF01.1M	2	Incremental encoder with sine signals from the Heidenhain Company, with either uA or 1V signals
DZF02.1M	3	Indramat gear-type encoder
DFF01.1M	4	Digital servo feedback from the Heidenhain or Stegmann companies
DEF01.1M	5	Incremental encoder with square-wave signals from the Heidenhain company
DEF02.1M	6	Incremental encoder with square-wave signals from the Heidenhain company
DAG01.2M	7	Encoder with SSI interface
DAG01.2M	8	Encoder with EnDat interface
DZF03.1M	9	Gearwheel encoder with 1Vpp signals

Fig. 3-17: P-0-0075, Interface feedback 2, external

Restrictions:

Modules DLF, DZF, DRF and DEF 1 must not be operated simultaneously in a controller. => **Danger of Damage!**

It is not possible to combine DLF and DZF.
Module DEF 2 can be used to operate an incremental encoder along with DLF or DZF.

See also the functional description: "Determining the Feedback Interface of the Motor Feedback".

P-0-0075 - Attributes

Para. Name:	**DE**	Geber-Typ 2		
	EN	Feedback 2 type		
	FR	Type de codeur 2		
	ES	Tipo de encoder 2		
	IT	Tipo di Feedback 2		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0081, Parallel I/O output 1

The control system can use this parameter to address the outputs of the DEA 4.1 I/O card.

See also the functional description: "Digital input/output".

P-0-0081 - Attributes

Para. Name:	**DE**	Paralleler Ausgang 1		
	EN	Parallel I/O output 1		
	FR	Sortie parallèle 1		
	ES	Salida paralela 1		
	IT	Uscita parallela 1		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0082, Parallel I/O input 1

The control system can use this parameter to address the inputs of the DEA 4.1 I/O card.

See also the functional description: "Digital input/output"

P-0-0082 - Attributes

Para. Name:	**DE**	Paralleler Eingang 1		
	EN	Parallel I/O input 1		
	FR	Entrée parallèle 1		
	ES	Entrada paralela 1		
	IT	Ingressi paralleli 1		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0097, Absolute encoder monitoring window

The absolute encoder monitoring compares during **S-0-0128, C200 Communication phase 4 transition check** the position saved during the last powering down with the current absolute feedback.

If the difference is greater than what is set in parameter P-0-0097, Absolute encoder monotoring window, the error message **F276 Absolute encoder out of allowed window** will be generated. This can happen, when the axis has been **moved with the power off**, or after changing the motor.

Note: If a 0 is parametrized in P-0-0097, Absolute encoder monitoring window, the absolute encoder monitor is deactivated.

As a standard value, 0.1 motor revolution (= 36 degrees in reference to the motor shaft) can be programmed if the axis has an electrically released brake or a self braking mechanic.

See also the functional description: "Absolute encoder monitoring".

P-0-0097 - Attributes

Para. Name:	**DE**	Absolutgeber-Überwachungsfenster		
	EN	Absolute encoder monitoring window		
	FR	Fenêtre de surveillance du codeur absolu		
	ES	Ventana de control de encoder absoluto		
	IT	Finestra di Controllo del Encoder assoluto		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0098, Max. model deviation

The maximum model deviation is the maximum deviation between the real position feedback value and the model position feedback value calculated by the drive.

This parameter can be read out by the user to help set the parameter for **S-0-0159, Monitoring window**.

Two cases must be distinguished for determining the model position feedback value:

1) Position control with following (lag) error

In this operating mode, the controlled system is simulated by a model.

The maximum deviation between the calculated position feedback module value and the real position feedback value is stored in the parameter P-0-0098.

2) Position control without following (lag) error

In this operating mode, the position command value is compared to the position feedback value. The maximum deviation encountered is stored in P-0-0098.

Note: This parameter can be write accessed so that it can be set back to 0, for example.

See also the functional description: "Position control loop monitoring".

P-0-0098 - Attributes

Para. Name:	**DE**	Max. Modellabweichung		
	EN	Max. model deviation		
	FR	Ecart maxi. au modèle		
	ES	Desviación máx. del modelo		
	IT	Deviazione mass. da Modello		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0099, Position command smoothing time constant

The position command smoothing time constant determines the maximum jerk possible in operation modes with closed loop position control.

The maximum jerk is determined by:

$$\text{max. jerk} = \frac{\text{2nd derivative of the position command values}}{\textbf{P-0-0099 Position command value smoothing filter time constant}}$$

Fig. 3-18: Max. jerk

If you don't want to activate a filter, set P-0-0099 >= S-0-0001, NC Cycle time (TNcyc) (greater or equal).

See also the functional description: "Command value processing: Position Control".

P-0-0099 - Attributes

Para. Name:	**DE**	Lagesollwert-Glättungsfilter-Zeitkonstante		
	EN	Position command smoothing time constant		
	FR	Temps de filtrage consigne de pos.		
	ES	Tiempo de alisamiento posición comando		
	IT	Tempo per Smorzamento Comandi Posiz.		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		ms	**Extrem value check:**	yes
Decimal places:		2	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0109, Torque/force peak limit

The maximum peak torque of a drive can be limited in a manner suitable to an application with the use of parameter P-0-0109, Torque/ force peak limit. In other words, the parameter ensures that the max. torque specific to the application is not exceeded even if **S-0-0092, Bipolar torque/force limit value** is set exceedingly high.

See function description: "Torque/Force Limiting".

P-0-0109 - Attributes

Para. Name:	**DE**	Spitzendrehmoment/-Kraft-Begrenzung		
	EN	Torque/force peak limit		
	FR	Limitation couple/force crête		
	ES	Limite par/fuerza punta		
	IT	Limitazione Picco Coppia/Forza		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0086	**Extrem value check:**	yes
Decimal places:		S-0-0086	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0110, Parallel I/O output 2

The control system can use this parameter to address the outputs of the DEA 5.1 I/O card.

See also the functional description: "Digital input/output"

P-0-0110 - Attributes

Para. Name:	**DE**	Paralleler Ausgang 2		
	EN	Parallel I/O output 2		
	FR	Sortie parallèle 2		
	ES	Salida paralela 2		
	IT	Uscite parallele 2		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0111, Parallel I/O input 2

The input signals of DEA 5.1 are produced in this parameter.

See also the functional description: "Digital input/output"

P-0-0111 - Attributes

Para. Name:	**DE**	Paralleler Eingang 2		
	EN	Parallel I/O input 2		
	FR	Entrée parallèle 2		
	ES	Entrada paralela 2		
	IT	Ingressi paralleli 2		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0112, Parallel I/O output 3

The control system can use this parameter to address the outputs of the DEA 6.1 I/O card.

See also the functional description: "Digital input/output"

P-0-0112 - Attributes

Para. Name:	**DE**	Paralleler Ausgang 3		
	EN	Parallel I/O output 3		
	FR	Sortie parallèle 3		
	ES	Salida paralela 3		
	IT	Uscite parallele 3		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0113, Parallel I/O input 3

The input signals of DEA 6.1 are produced in this parameter.

See also the functional description: "Digital input/output"

P-0-0113 - Attributes

Para. Name:	**DE**	Paralleler Eingang 3		
	EN	Parallel I/O input 3		
	FR	Entrée parallèle 3		
	ES	Entrada paralela 3		
	IT	Ingressi paralleli 3		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0117, NC reaction on error

This parameter allows the NC 30 seconds to bring the drive controller to a coordinated deceleration in an error situation if the parameter is set with a "1“. The drive follows the command for this period. The drive reacts with the preset **P-0-0119, Best possible deceleration**.

This feature works for non-fatal errors.

Parameter structure:

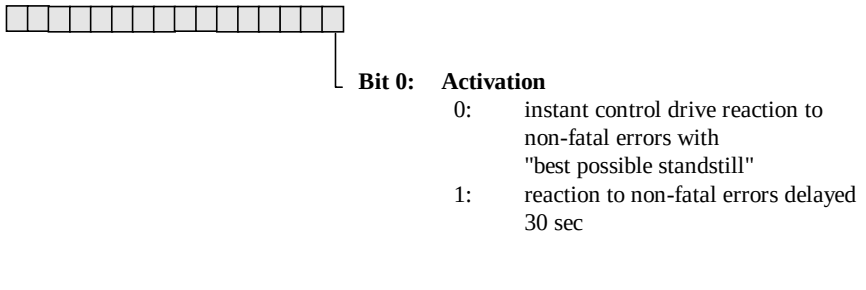
Bit 0: Activation
0: instant control drive reaction to non-fatal errors with "best possible standstill"
1: reaction to non-fatal errors delayed 30 sec

Fig. 3-19: P-0-0117, NC reaction on error

See also the functional description: "NC response in error situation"

P-0-0117 - Attributes

Para. Name:	**DE**	Aktivierung NC-Reaktion im Fehlerfall		
	EN	NC reaction on error		
	FR	Activation réaction CN en cas de défaut		
	ES	Activación reaccion NC en caso de error		
	IT	Reazione in Presenza Errore NC		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0118, Power off on error

How a drive error is signalled to the drive pack or to the supply module, can be activated in the parameter P-0-0118, Power off on error.

Moreover, there are following possibilities to set the reaction upon error:

- Power off / packet reaction in case of error (bit 0)
- Condition for power up (bit 1)
- Time for switching the power off (bit 2)
- Reaction upon undervoltage (bit 3)
- Undervoltage as fatal warning (bit 4)
- Automatic clearance of undervoltage (bit 5)

Parameter structure:

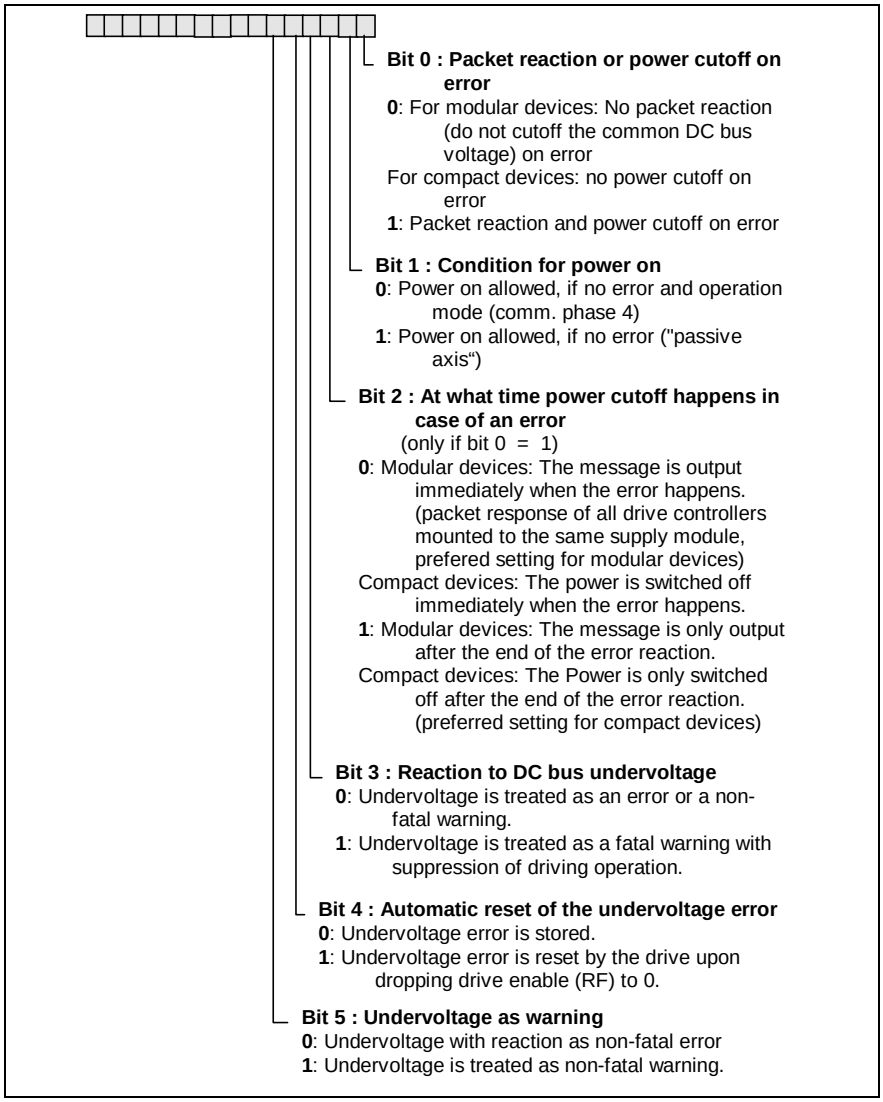
Bit 0 : Packet reaction or power cutoff on error
0: For modular devices: No packet reaction (do not cutoff the common DC bus voltage) on error
For compact devices: no power cutoff on error
1: Packet reaction and power cutoff on error
Bit 1 : Condition for power on
0: Power on allowed, if no error and operation mode (comm. phase 4)
1: Power on allowed, if no error ("passive axis")
Bit 2 : At what time power cutoff happens in case of an error
(only if bit 0 = 1)
0: Modular devices: The message is output immediately when the error happens. (packet response of all drive controllers mounted to the same supply module, prefered setting for modular devices)
Compact devices: The power is switched off immediately when the error happens.
1: Modular devices: The message is only output after the end of the error reaction.
Compact devices: The Power is only switched off after the end of the error reaction. (preferred setting for compact devices)
Bit 3 : Reaction to DC bus undervoltage
0: Undervoltage is treated as an error or a non-fatal warning.
1: Undervoltage is treated as a fatal warning with suppression of driving operation.
Bit 4 : Automatic reset of the undervoltage error
0: Undervoltage error is stored.
1: Undervoltage error is reset by the drive upon dropping drive enable (RF) to 0.
Bit 5 : Undervoltage as warning
0: Undervoltage with reaction as non-fatal error
1: Undervoltage is treated as non-fatal warning.

Fig. 3-20: P-0-0118, Power off on error

See also the functional description: "Power off on error".

P-0-0118 - Attributes

Para. Name:	**DE**	Leistungsabschaltung im Fehlerfall		
	EN	Power off on error		
	FR	Mise hors tension en cas de défaut		
	ES	Desconexion de potencia en caso de error		
	IT	Spegnimento Potenza in Caso di Errore		
Function:		Parameter	**Editability:**	P23
Data length:		--	**Memory:**	-
Format:		BIN	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0119, Best possible deceleration

This parameter specifies the type of braking to a standstill for the drive in the event of

- a non-fatal error
- an interface error
- a phase regression
- switching off the drive enable signal

P-0-0119:	Reaction type:
0	**Velocity command value set to zero** The motor brakes in regard to the torque limit value. The **Braking time** is set in parameter **P-0-0126**. 100 milliseconds before the brake time elapses, the blocking brake is activated. If the velocity has previously fallen below 10 rpm (rotational motors) or below 10 mm/min (linear motors), then the blocking brake will be engaged immediately. 100 milliseconds after the mechanical brake is set, the motor is torque free.
1	**Switch to torque-free state**
2	**Velocity command to zero** with command ramp and filter. The ramp, i.e. the maximum accel., is set via **P-0-1201 Ramp 1 pitch**, the jerk filter via **P-0.1222, Velocity command filter**.

Fig. 3-21: Deceleration mode for the drive

The drive enable can be set again, at the earliest, after the operation of the error reaction.

See also the functional description: "Drive Error Reaction".

P-0-0119 - Attributes

Para. Name:	**DE**	Bestmögliche Stillsetzung
	EN	Best possible deceleration
	FR	Arrêt au plus vite
	ES	La mejor parada posible
	IT	Decellerazione massima

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	yes
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-0121, Velocity mix factor feedback 1 & 2

The Velocity mix factor parameter determines the relation of the velocity feedback values between the motor encoder and the optional encoder.

The input is percentage-based. Note the following:

0 % : The velocity controller works solely with the velocity of the motor encoder (= encoder 1).

100 % : The velocity controller works solely with the velocity of the opt. encoder (= encoder 2).

If no optional encoder is available, then the parameter is set to 0 % .

See also the functional description: "Setting the velocity mix factor".

P-0-0121 - Attributes

Para. Name:	**DE**	Geschwindigkeits-Mischfaktor Geber 1 & Geber 2		
	EN	Velocity mix factor feedback 1 & 2		
	FR	Facteur de mixage vitesse codeur 1 & codeur 2		
	ES	Factor mixto de velocidad encoder 1 & 2		
	IT	Fattore di Correzione Feedback 1 & 2		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		%	**Extrem value check:**	no
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0123, Absolute encoder buffer

All the data that the absolute encoder needs for position initialization is stored in this parameter.

See also the functional description: "Other Settings for Absolute Measurement Systems".

P-0-0123 - Attributes

Para. Name:	**DE**	Absolutgeber-Puffer		
	EN	Absolute encoder buffer		
	FR	Tampon codeur absolu		
	ES	Buffer de encoder absoluto		
	IT	Buffer Encoder assoluto		
Function:		Parameter	**Editability:**	no
Data length:		2Byte var.	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0124, Assignment IDN -> DEA-output

This parameter is used to assign a parameter value to a DEA output. If the data capacity of the assigned parameter is greater than that of the DEA port, then the higher-valued bits will be truncated.

Parameter structure:

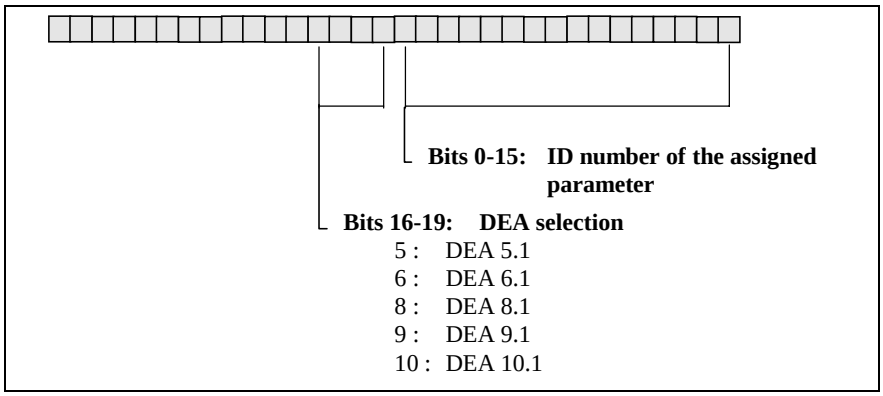

Fig. 3-22: P-0-0124, Assignment IDN -> DEA output

The contents of the parameter are written to the DEA output.

The main spindle firmware (AHS) makes already use of the DEA4.1 for digital I/O. Therefore, the DEA4.1 cannot be assigned with AHS.

Note: If an ID number is assigned to DEA 5.1, then parameter P-0-0110, Parallel I/O output 2 can no longer be used.

The same restriction applies to:

- Assignment DEA 6.1 <> **P-0-0113, Parallel I/O output 3**
- Assignment DEA 8.1 <> **P-0-0170, Parallel I/O output 4**
- Assignment DEA 9.1 <> **P-0-0172, Parallel I/O output 5**
- Assignment DEA 10.1 <> **P-0-0174, Parallel I/O output 6**

See also the functional description: "Digital input/output"

P-0-0124 - Attributes

Para. Name:	**DE**	Zuweisung Identnummer -> DEA-Ausgang		
	EN	Assignment IDN -> DEA-output		
	FR	Assignation IDN -> sortie DEA		
	ES	Asignación numero ident -> salida DEA		
	IT	Assegnazione IDN -> DEA Uscite		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		HEX	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0125, Assignment DEA-input -> IDN

This parameter can be used to assign a DEA input to the value of a parameter.

The input status of the DEA is written in the corresponding parameter.

Parameter structure:

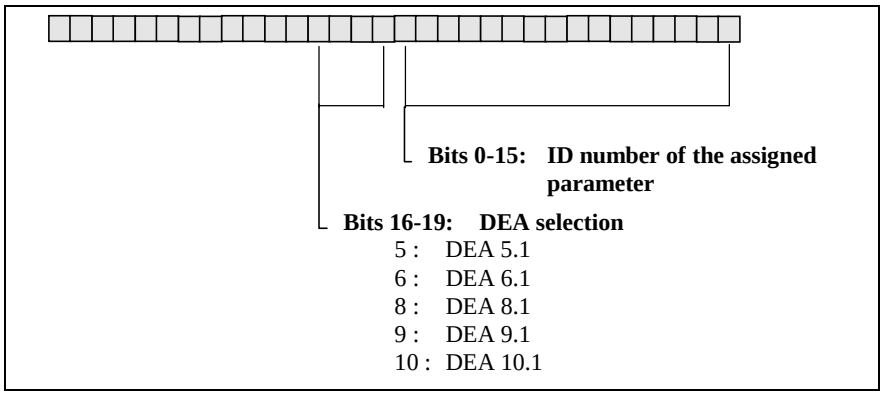

Fig. 3-23: P-0-0125, Assignment DEA-input -> IDN

The main spindle firmware (AHS) makes already use of the DEA4.1 for digital I/O. Therefore, the DEA4.1 cannot be assigned with AHS.

Note: If a DEA is assigned an ID number using parameter P-0-0125, then the operating data of the assigned ID number will be cyclically overwritten by the DEA input.

See also the functional description: "Digital input/output".

P-0-0125 - Attributes

Para. Name:	**DE**	Zuweisung DEA-Eingang -> Identnummer		
	EN	Assignment DEA-input -> IDN		
	FR	Assignation entrée DEA -> IDN		
	ES	Asignación entrada DEA -> Numero de ident		
	IT	Assegnazione Ingressi DEA -> IDN		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		HEX	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0126, Maximum braking time

The maximum braking time for the drive is set in this parameter.

The value should always be set higher then the time needed, considering the maximum possible velocity, to decelerate the shaft using velocity command value zero-switching.

The velocity command value is switched to zero if **P-0-0119, Best possible deceleration** is set to 0 and either

- The drive enable (RF) is removed
- The drive is switched to Set parameter mode with RF switched on
- A drive error is recognized that still allows a reaction from the drive (all non-fatal errors)
- In the case of separately supplied devices (HDS), a drive connected to the same supply module reports an error to that module, so that the intermediate voltage is switched off.

P-0-0126 - Attributes

Para. Name:	**DE**	Maximale Bremszeit		
	EN	Maximum braking time		
	FR	Temps de freinage max.		
	ES	Tiempo máx. de frenado		
	IT	Tempo massimo di Frenata		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		ms	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0127, Overload warning

To protect the power stage, the temperature is calculated with a temperature model for the transistor final stage. If the temperature exceeds 125°C, then the torque-producing command current will be limited.

To avoid an unexpected disruption of the torque from the drive, a warning threshold can be set in this parameter.

If the thermal load rises above the set value, warning **E261 Continuous current limiting prewarning** will be generated.

If 100% is entered, this warning will be deactivated, because then the message **E257 Continuous current limit active** will be generated instead.

See also the functional description: "Monitoring the Thermal Load of the drive controller".

P-0-0127 - Attributes

Para. Name:	**DE**	Überlastwarnung		
	EN	Overload warning		
	FR	Alerte surcharge		
	ES	Aviso de sobrecarga		
	IT	Preallarme Sovracarico		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		%	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0139, Analog output 1

The parameter **P-0-0139, Analog output 1** sets the voltage value for the analog output 1 of the drive controller.

See also the functional description: "Analog Output".

P-0-0139 - Attributes

Para. Name:	**DE**	Analogausgang 1		
	EN	Analog output 1		
	FR	Sortie analogique 1		
	ES	Salida analogica 1		
	IT	Uscita analogica 1		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		V	**Extrem value check:**	yes
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0140, Analog output 2

The parameter **P-0-0140, Analog output 2** sets the voltage value for the analog output 2 of the drive controller.

See also the functional description: "Analog Output".

P-0-0140 - Attributes

Para. Name:	**DE**	Analogausgang 2		
	EN	Analog output 2		
	FR	Sortie analogique 2		
	ES	Salida analogica 2		
	IT	Uscita analogica 2		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		V	**Extrem value check:**	yes
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0141, Thermal drive load

The parameter P-0-0141, Thermal drive load is for diagnostic purposes. In this parameter, 0% corresponds to a chip over-temperature of 0 Kelvin, 100% corresponds to the maximum chip over-temperature. The thermal load should not exceed a value of 80% for the applied operating cycles if the drive is set up correctly.

It typically takes about 10 minutes to warm up a drive controller end stage to its final temperature. To check the thermal load of a drive during installation without having to run operating cycles during this period of time, the drive controller load can be preset with 80%. This can happen by writing an arbitrary value to the parameter **P-0-0141, Thermal drive load**.

See also the functional description: "Checking the Thermal Load of the drive controller".

P-0-0141 - Attributes

Para. Name:	**DE**	Thermische Regelgeräte-Auslastung		
	EN	Thermal drive load		
	FR	Charge thermique variateur		
	ES	Descarga termica de reguladores		
	IT	Carico termico Azionamento		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		%	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0145, Expanded trigger level

This parameter is for service purposes only.

If bit 12, Expanded trigger level is selected using parameter **P-0-0026, Trigger signal selection**, then an address can be selected with parameter P-0-0145 that is monitored for the threshold parameter value.

Parameter structure:

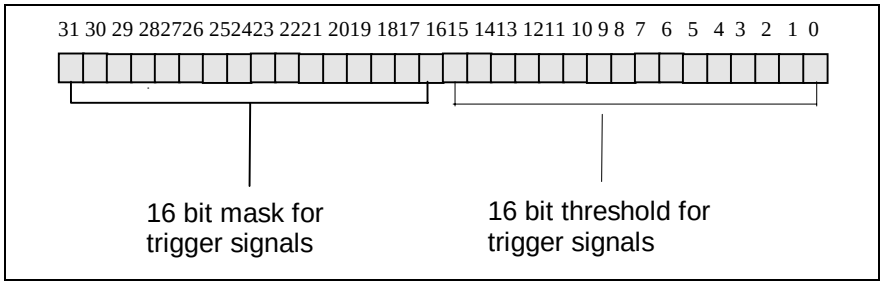

Fig. 3-24: P-0-0145, Expanded trigger level (oscilloscope function)

See also the functional description: "Oscilloscope feature".

P-0-0145 - Attributes

Para. Name:	**DE**	Triggerschwelle erw.Oszilloskopfunktion		
	EN	Expanded trigger level		
	FR	Seuil de déclenchement fonction oscill. élargie		
	ES	Umbral de trigger función ampliada de osciloscopio		
	IT	Superamento Soglia Fronte di Trigger		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		HEX	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0146, Expanded trigger address

This parameter is for service purposes only.

If bit 12 Expanded trigger level is selected in using parameter **P-0-0026, Trigger signal selection**, then an address can be selected with parameter P-0-0146 that is monitored for the threshold parameter value.

Parameter structure:

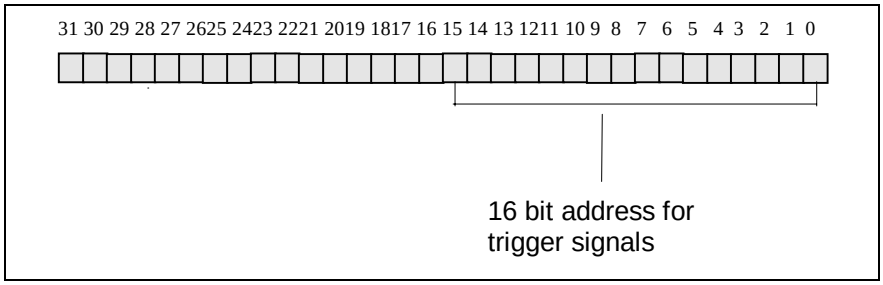

Fig. 3-25: P-0-0146, Expanded trigger address

The 16-bit value of the trigger edge is monitored. Before, the trigger signal is ANDed with the mask for trigger signals.

See also the functional description: "Oscilloscope feature".

P-0-0146 - Attributes

Para. Name:	**DE**	Triggersignaladresse erw. Oszilloskopfunktion		
	EN	Expanded trigger address		
	FR	Adresse déclenchement fonction ocill. élargie		
	ES	Dirección de trigger función de osciloscopio ampliada		
	IT	Superamento Indirizzo del Segnale di Trigger		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		HEX	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0147, Expanded signal K1 address

If an expanded signal selection is made with parameters **P-0-0023, Signal select scope channel 1** and **P-0-0024, Signal select scope channel 2**, then an address to be recorded can be chosen in the drive with parameter P-0-0147.

See also the functional description: "Oscilloscope feature".

P-0-0147 - Attributes

Para. Name:	**DE**	Signaladresse K1 erw. Oszilloskopfunktion
	EN	Expanded signal K1 address
	FR	Adresse signal K1 fonction oscill. élargie
	ES	Dirección de señal K1 función de osciloscopio ampliada
	IT	Indirizzo Segnale K1

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	HEX	**Validity check:**	no
Unit:	--	**Extrem value check:**	no
Decimal places:	--	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-0148, Expanded signal K2 address

If an expanded signal selection is chosen with parameters **P-0-0023, Signal select scope channel 1** and **P-0-0024, Signal select scope channel 2**, then an address to be recorded can be chosen in the drive with parameter P-0-0148.

See also the functional description: "Oscilloscope feature".

P-0-0148 - Attributes

Para. Name:	**DE**	Signaladresse K2 erw. Oszilloskopfunktion
	EN	Expanded signal K2 address
	FR	Adresse signal K2 fonction oscill. élargie
	ES	Dirección de señal K2 función de osciloscopio ampliada
	IT	Indirizzo Segnale K2

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	HEX	**Validity check:**	no
Unit:	--	**Extrem value check:**	no
Decimal places:	--	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-0149, List of selectable signals for oscilloscope function

The control system can read drive-supported, predefined signals with parameter P-0-0149. This permits a user interface to prepare a signal select menu using the information in the listed parameters in the drive.

List entries:	ID number of:
1	S-0-0051 or S-0-0053
2	S-0-0040
3	S-0-0347
4	S-0-0189
5	S-0-0080
6	S-0-0051
7	S-0-0053
8	S-0-0047
9	P-0-0147
10	P-0-0148

Fig. 3-26: P-0-0149, List of selectable signals for oscilloscope function

See also the functional description: "Oscilloscope feature".

P-0-0149 - Attributes

Para. Name:	**DE**	Signalauswahlliste für Oszilloskopfunktion		
	EN	List of selectable signals for oscilloscope function		
	FR	Liste sélection signaux pour fonction oscilloscope		
	ES	Lista de selección de señal para función de osciloscopio		
	IT	Lista dei Segnali validi per Funzione Oscilloscopio		
Function:		Parameter	**Editability:**	no
Data length:		2Byte var.	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0150, Number of valid samples for oscilloscope function

If the oscilloscope function is activated then the signal to be recorded is continously fed to a value memory. If triggering occurs, then the recording procedure is stored and the value list can be read out. The oldest measured value is the first element of this list, the newest value the last.

If triggering occurs before the memory is completely filled, then a number of values at the start of the list are invalid.The number of valid values before triggering is available in parameter **P-0-0150, Number of valid samples for oscilloscope function**.

See also the functional description: "Oscilloscope feature".

P-0-0150 - Attributes

Para. Name:	**DE**	Anzahl gültiger Messwerte für Oszilloskopfunktion		
	EN	Number of valid samples for oscilloscope function		
	FR	Nombre de mesures valides pour fonction oscilloscope		
	ES	Numero valores de medición validos para función osciloscopio		
	IT	Numero dei Campionamenti validi per Funz. Oscill.		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0170, Parallel I/O output 4

Parameter **P-0-0170, Parallel I/O Output 4** displayes the parallel outputs of the DEA. 8.1 I/O module which can adress the outputs of this module.

See also the functional description: "Digital Input/Output“

P-0-0170 - Attributes

Para. Name:	**DE**	Paralleler Ausgang 4		
	EN	Parallel I/O output 4		
	FR	Sortie parallèle 4		
	ES	Salida paralela 4		
	IT	Uscita parallela 4		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		HEX	**Validity check:**	no
Unit:			**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0171, Parallel I/O input 4

Parameter **P-0-0171, Parallel I/O Input 4** displayes the parallel inputs of the DEA. 5.1 I/O module which can adress the inputs of this module.

See also the functional description: "Digital Input/Output“

P-0-0171 - Attributes

Para. Name:	**DE**	Paralleler Eingang 4		
	EN	Parallel I/O input 4		
	FR	Entrée parallele 4		
	ES	Entrada paralela 4		
	IT	Ingressi paralleli 4		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		HEX	**Validity check:**	no
Unit:			**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0172, Parallel I/O output 5

Parameter **P-0-0172, Parallel I/O Output 5** displayes the parallel outputs of the DEA. 9.1 I/O module which can adress the outputs of this module.

See also the functional description: "Digital Input/Output“

P-0-0172 - Attributes

Para. Name:	**DE**	Paralleler Ausgang 5
	EN	Parallel I/O output 5
	FR	Sortie parallèle 5
	ES	Salida paralela 5
	IT	Uscita parallela 5

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	HEX	**Validity check:**	no
Unit:		**Extrem value check:**	no
Decimal places:	--	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-0173, Parallel I/O input 5

Parameter **P-0-0173, Parallel I/O Input 5** displayes the parallel inputs of the DEA. 5.1 I/O module which can adress the inputs of this module.

See also the functional description: "Digital Input/Output“

P-0-0173 - Attributes

Para. Name:	**DE**	Paralleler Eingang 5		
	EN	Parallel I/O input 5		
	FR	Entrée parallèle 5		
	ES	Entrada paralela 5		
	IT	Ingressi paralleli 5		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		HEX	**Validity check:**	no
Unit:			**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0174, Parallel I/O output 6

Parameter **P-0-0174, Parallel I/O Output 6** displayes the parallel outputs of the DEA. 10.1 I/O module which can adress the outputs of this module.

See also the functional description: "Digital Input/Output“

P-0-0174 - Attributes

Para. Name:	**DE**	Paralleler Ausgang 6		
	EN	Parallel I/O output 6		
	FR	Sortie parallèle 6		
	ES	Salida paralela 6		
	IT	Uscita parallela 6		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		HEX	**Validity check:**	no
Unit:			**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0175, Parallel I/O input 6

Parameter **P-0-0175, Parallel I/O Input 6** displayes the parallel inputs of the DEA. 10.1 I/O module which can adress the inputs of this module.

See also the functional description: "Digital Input/Output“

P-0-0175 - Attributes

Para. Name:	**DE**	Paralleler Eingang 6		
	EN	Parallel I/O input 6		
	FR	Entrée parallèle 6		
	ES	Entrada paralela 6		
	IT	Ingressi paralleli 6		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		HEX	**Validity check:**	no
Unit:			**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0176, Torque/Force command smoothing time constant

The parameter P-0-0176, Torque/force command smoothing time constant is only active during the operation mode Torque control.

The time constant input here filters during torque control the command value given by S-0-0080, Torque/Force command via a low pass filter. This can smoothen acceleration jumps in successive command values.

See also the functional description: "Operating Mode: Torque Control".

P-0-0176 - Attributes

Para. Name:	**DE**	Drehmoment/Kraft-Sollwert Glättungszeitkonstante		
	EN	Torque/Force command smoothing time constant		
	FR	Temps de filtrage pour consigne de couple/force		
	ES	Tiempo de alisamiento para comando par/fuerza		
	IT	Tempo di Smorzamento per Coppia/Forza comandata		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	Param.-E²prom
Format:		DEC_OV	**Validity check:**	P3-4
Unit:		ms	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		0 / 1000		
Default value:		0	**Cyc. transmittable:**	no

P-0-0180, Rejection frequency velocity loop

To supress the mechanical resonance frequency, a band filter can be activated at the output of the velocity controller .It is parametrized with parameters **P-0-0180, Rejection frequency velocity loop** and **P-0-0181, Rejection bandwidth velocity loop**.

P-0-0180, Rejection frequency velocity loop indicates the most attenuated frequency.

See also the functional description: "Filtering oscillations from mechanical resonance".

P-0-0180 - Attributes

Para. Name:	**DE**	Sperrfrequenz Geschwindigkeitsregler		
	EN	Rejection frequency velocity loop		
	FR	Fréquence á supprimer, boucle de vitesse		
	ES	Frecuencia a eliminar Regulador de velocidad		
	IT	Frequenza da sopprimere, Anello di Velocità		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		Hz	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0181, Rejection bandwidth velocity loop

To supress the mechanical resonance frequency, a band filter can be activated at the output of the velocity controller. It is parametrized with parameters **P-0-0180, Rejection frequency velocity loop** and **P-0-0181, Rejection bandwidth velocity loop**.

P-0-0181, Rejection bandwidth velocity loop sets the frequency range for the locking frequency with an attenuation smaller than -3dB.

Example:

P-0-0180 = 500 Hz,

P-0-0181 = 200 Hz;

then: attenuation < -3dB in range of 400..600 Hz.

Parameter content	Effect of P-0-0181
-1	low pass filter with time constant P-0-0004
0	filter is off
>0	bandwidth of suppression (notch) filter

Fig. 3-27: P-0-0181, Rejection bandwidth velocity loop

See also the functional description: "Filtering oscillations from mechanical resonance".

P-0-0181 - Attributes

Para. Name:	**DE**	Bandbreite Sperrfilter Geschwindigkeitsregler		
	EN	Rejection bandwidth velocity loop		
	FR	Gamme de bande à supprimer, boucle de vitesse		
	ES	Ancho de banda a eliminar regulador de velocidad		
	IT	Larghezza Banda da sopprimere, Anello di Velocità		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		Hz	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0185, Function of encoder 2

Parameter P-0-0185 can be used to allocate a specific function to an external encoder. The following functions are defined:

P-0-0185	Function of encoder 2
0	optional control encoder
2	Load side motor encoder
4	Spindle encoder

Fig. 3-27: Functions of encoder 2

Explanation:

For 0: If the optional encoder is used as a **control encoder**, it can be used to close the control loop. All modes are possible with ext. encoder. The position value is set in **S-0-0053, Position feedback 2 value**.

For 2: If the optional encoder is used as a **motor encoder**, the control loop and commutation are generated from this encoder. Only **S-0-0053, Position feedback 2 value** is supported.

Zu 4: Optional encoder as **Spindle encoder**. Usage like "optional control encoder as additional load side control encoder for position and/or velocity loop". However, when the max. possible signal frequency is exceeded, no error is generated, but only the position status is cleared.

See also the functional description: "Optional encoder".

P-0-0185 - Attributes

Para. Name:	**DE**	Funktion Geber 2		
	EN	Function of encoder 2		
	FR	Fonction du codeur 2		
	ES	Función del encoder 2		
	IT	Funzione del Encoder 2		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	yes
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0190, Operating hours control section

The operating hours of the control section are displayed here. With this parameter, the entire on time of control electronics since installation of the unit can be displayed. If a class 1 error occurs, the contents of this parameter at that time is first stored in **P-0-0193, Error recorder, operating hours control section**.

See also the functional description: "Error memory and operating hour counter".

P-0-0190 - Attributes

Para. Name:	**DE**	Betriebsstunden Steuerteil		
	EN	Operating hours control section		
	FR	Heures de fonctionnement contrôle		
	ES	Horas de servicio sesión de control		
	IT	Ore d'Operazione Sezione Controllo		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		h	**Extrem value check:**	no
Decimal places:		4	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0191, Operating hours power section

With this parameter, the entire on time of control electronics since installation of the unit can be displayed. This is the time over which the drive was operated with drive enable on.

See also the functional description: "Error memory and operating hour counter".

P-0-0191 - Attributes

Para. Name:	**DE**	Betriebsstunden Leistungsteil		
	EN	Operating hours power section		
	FR	Heures de fonctionnnement puissance		
	ES	Horas de servicio parte de potencia		
	IT	Ore d'Operazione Sezione Potenza		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		h	**Extrem value check:**	no
Decimal places:		4	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0192, Error recorder, diagnosis number

If the drive reports a class 1 error (C1D), a bit is set in **S-0-0011, Class 1 diagnostics** C1D. In the drive status word Bit 13 for "Error C1D“ is set.

Additionally, for a precise diagnosis,

- the diagnosis number is shown in the 7- segment display and stored in **S-0-0390, Diagnostic message number**,
- the plain text diagnosis is stored in **S-0-0095, Diagnostic message**,
- and the relevant error number in **P-0-0009, Error message number**.

When the error is cleared, then the diagnosis number of the error displayed **in S-0-0390, Diagnostic message number** is stored in **P-0-0192, Error recorder diagnosis number**. This parameter shows the diagnosis numbers of the last 19 errors in chronological order in the form of a stack memory. The last cleared error is on top.

The status of **P-0-0190, Operating hours control section** at the time the error was deleted is stored in **P-0-0193, Error recorder, operating hours control section**.

See also the functional description: "Error memory and operating hour counter".

P-0-0192 - Attributes

Para. Name:	**DE**	Fehlerspeicher Diagnosenummer		
	EN	Error recorder, diagnosis number		
	FR	Enregistrement d'erreurs, numéros de diagnostique		
	ES	Memoria de errores número de diagnóstico		
	IT	Memoria dei Guasti, Numeri Diagnosi		
Function:		Parameter	**Editability:**	no
Data length:		2Byte var.	**Memory:**	-
Format:		HEX	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0193, Error recorder, operating hours control section

If the drive reports a class 1 error (C1D), then a bit is set in **S-0-0011, Class 1 diagnostics** C1D. Bit 13 for "Error C1D“ is set in the drive status word.

Additionally, for a precise diagnosis,

- the diagnosis number is shown in the 7-segment display and stored in **S-0-0390, Diagnostic message number**,
- the clear text diagnosis is stored in **S-0-0095, Diagnostic message**,
- and the relevant error number in **P-0-0009, Error message number**.

When the error is reset, then the status of **P-0-0190, Operating hours control section** at the time the error was detected is stored in **P-0-0193, Error recorder, operating hours control section**. This parameter shows the diagnosis numbers of the last 19 errors in chronological order. On the topmost position, there is the counter value of the last occured error.

The status of **P-0-0192, Error recorder diagnosis number** at the time the error was deleted in the order in **S-0-0390, Diagnostic message number**.

See also the functional description: "Error memory and operating hour counter".

P-0-0193 - Attributes

Para. Name:	**DE**	Fehlerspeicher Betriebstunden Steuerteil
	EN	Error recorder, operating hours control section
	FR	Enregistrement d'erreurs, heures de fonctionnement cont.
	ES	Memoria de errores horas de servicio parte de control
	IT	Memoria dei Guasti, Ore d'Operazione

Function:	Parameter	**Editability:**	no
Data length:	4Byte var.	**Memory:**	-
Format:	HEX	**Validity check:**	Phase3
Unit:	--	**Extrem value check:**	no
Decimal places:	--	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-0194, List of present plug-in modules

Each plug-in module is assigned a card code. The code for the cards installed in the controller can be read off in the list below.

There is the following relationship between plug-in card and card code:

Card code	Plug-in module
1	DEF2.1
2	DEF1.1
3	DLF1.1
4	DAE1.1
5	DQM1.1
6	DAE2.1
7	DAA1.1
8	DEA4.1
9	DEA5.1
10	DEA6.1
11	DFF1.1
12	free
13	DAG1.2
14	DAF1
15	DEA8.1
16	DEA9.1

Card code	Plug-in module
17	DEA10.1
18	DEA11.1
19	DEF4.1
20	DEF3.1
21	DLC1.1
22	DSS1.1
23	DSS2.1
24	DBS2.1
25	DPF2.1
26	DPF3.1
27	DPF4.1
28	DRF1.1
29	DBS1.1
30	DSA1.1
31	DZF1.1 or DZF2.1
32	DZF3.1

P-0-0194 - Attributes

Para. Name:	**DE**	Liste der gesteckten Einschubmodule
	EN	List of present plug-in modules
	FR	Liste des modules branchés
	ES	Lista de los módulos introducidos
	IT	Lista dei moduli collegati

Function:	Parameter	**Editability:**	no
Data length:	2Byte var.	**Memory:**	-
Format:	DEC_OV	**Validity check:**	no
Unit:	--	**Extrem value check:**	no
Decimal places:	--	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-#

P-0-0210, Analog input 1

This parameter displays the analog voltage applied at the analog channel 1 in volts with 3 decimal places.

See also the functional description: "Analog Inputs".

P-0-0210 - Attributes

Para. Name:	**DE**	Analog-Eingang 1		
	EN	Analog input 1		
	FR	Entrée analogique 1		
	ES	Entrada analogica 1		
	IT	Ingresso analogico 1		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		V	**Extrem value check:**	no
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0211, Analog input 2

This parameter displays the analog voltage applied at the analog channel 2 in volts with 3 decimal places.

See also the functional description: "Analog Inputs".

P-0-0211 - Attributes

Para. Name:	**DE**	Analog-Eingang 2		
	EN	Analog input 2		
	FR	Entrée analogique 2		
	ES	Entrada analogica 2		
	IT	Ingresso analogico 2		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		V	**Extrem value check:**	no
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0212, Analog inputs, IDN list of assignable parameters

The digitalized values of both analog inputs are stored in **P-0-0210, Analog input 1** and **P-0-0211, Analog input 2**. These can be allocated via settable scaling to other drive parameters or cyclically copied. The allowed parameters for allocation are listed in **P-0-0212, Analog inputs, IDN list of assignable parameters**.

See also the functional description: "Analog Inputs".

P-0-0212 - Attributes

Para. Name:	**DE**	Analog-Eingänge, IDN-Liste der zuweisbaren Parameter		
	EN	Analog inputs, IDN list of assignable parameters		
	FR	Entrées analogiques, liste des param.s pouvant être assignés		
	ES	Entradas analógicas, lista IDN de parámetros asignables		
	IT	Ingressi analogichi, Lista dei Parametri assignabili		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	--
Decimal places:		--	**Combination check:**	--
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0213, Analog input 1, assignment

The digitalized values of both analog inputs are stored in **P-0-0210, Analog input 1** and **P-0-0211, Analog input 2**. These can be allocated via settable scaling to other drive parameters or cyclically copied.

To copy cyclically the analog input 1 to a drive parameter, the ID no. of this parameter must be entered.

If the ID no. Entered in **P-0-0213, Analog input 1, assignment** not in **P-0-0212, Analog inputs, IDN list of assignable parameters**, then the service channel error message "data not correct“ is generated.

Note: If the allocation is to be deleted, enter the ID no. S-0-0000.

See also the functional description: "Analog Inputs".

P-0-0213 - Attributes

Para. Name:	**DE**	Analog-Eingang 1, Zuweisung		
	EN	Analog input 1, assignment		
	FR	Entrée analogique 1, assignation		
	ES	Entrada analógica 1, asignación		
	IT	Ingresso analogico 1, Assignazione		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0214, Analog input 1, scaling per 10V full scale

The digitalized values of both analog inputs module are stored in the parameters **P-0-0210, Analog input 1** and **P-0-0211, Analog input 2**. These can be assigned to other drive parameters via settable scalings, i.e., copied.

If analog input 1 is cyclically copied to a drive parameter, i.e., an ID no. Has been entered in **P-0-0213, Analog input 1, assignment**, then avalue of 10V of the analog voltage in terms of the assigned parameter is entered.

The unit and the number of decimal places of **P-0-0214, Analog input 1, scaling per 10V full scale** correspond to those of **P-0-0213, Analog input 1, assignment**.When inputting **P-0-0213, Analog input 1, assignment**, both unit and decimal places of **P-0-0214, Analog input 1, scaling per 10V full scale** are switched appropriately.

See also the functional description: "Analog Inputs".

P-0-0214 - Attributes

Para. Name:	**DE**	Analog-Eingang 1, Bewertung pro 10V		
	EN	Analog input 1, scaling per 10V full scale		
	FR	Entrée analogique 1, calibrage pour 10V		
	ES	Entrada analógica 1, calibrado		
	IT	Ingresso analogico 1, Scala per 10V		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		---	**Validity check:**	no
Unit:		---	**Extrem value check:**	no
Decimal places:		---	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0215, Analog input 2, assignment

The digitalized values of both analog inputs are stored in **P-0-0210, Analog input 1** and **P-0-0211, Analog input 2**. These can be allocated via settable scaling to other drive parameters or cyclically copied.

To copy cyclically the analog input 2 to a drive parameter, the ID no. of this parameter must be entered.

If the ID no. Entered in **P-0-0213, Analog input 2, assignment** not in **P-0-0212, Analog inputs, IDN list of assignable parameters**, then the service channel error message "data not correct“ is generated.

Note: If the allocation is to be deleted, enter the ID no. S-0-0000.

See also the functional description: "Analog Inputs".

P-0-0215 - Attributes

Para. Name:	**DE**	Analog-Eingang 2, Zuweisung		
	EN	Analog input 2, assignment		
	FR	Entrée analogique 2, assignation		
	ES	Entrada analógica 2, asignación		
	IT	Ingresso analogico 1, Assignazione		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		---	**Combination check:**	no
Input min/max:		- / -		
Default value:	-	**Cyc. transmittable:**	-	

P-0-0216, Analog input 2, scaling per 10V full scale

The digitalized values of both analog inputs are stored in the parameters **P-0-0210, Analog input 1** and **P-0-0211, Analog input 2**. These can be assigned to other drive parameters via settable scalings, i.e., copied.

If analog input 1 is cyclically copied to a drive parameter, i.e., an ID no. Has been entered in **P-0-0215, Analog input 2, assignment**, then avalue of 10V of the analog voltage in terms of the assigned parameter is entered.

The unit and the number of decimal places of **P-0-0216, Analog input 2, scaling per 10V full scale** correspond to those of **P-0-0215, Analog input 2, assignment**. When inputting **P-0-0215, Analog input 2, assignment**, both unit and decimal places of **P-0-0216, Analog input 2, scaling per 10V full scale** are switched appropriately.

See also the functional description: "Analog Inputs".

P-0-0216 - Attributes

Para. Name:	**DE**	Analog-Eingang 2, Bewertung pro 10V		
	EN	Analog input 2, scaling per 10V full scale		
	FR	Entrée analogique 2, calibrage pour 10V		
	ES	Entrada analógica 2, calibrado		
	IT	Ingresso analogico 1, Scala per 10V		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		---	**Validity check:**	no
Unit:		---	**Extrem value check:**	no
Decimal places:		---	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0217, Analog input 1, offset

The analog channels can be processed with a DC offset. It has the unit millivolt, and this value is subtracted from the analog value.

See also the functional description: "Analog Inputs".

P-0-0217 - Attributes

Para. Name:	**DE**	Analog-Eingang 1, Offset		
	EN	Analog input 1, offset		
	FR	Entrée analogique 1, offset		
	ES	Entrada analogica 1, offset		
	IT	Ingresso analogico 1, Offset		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		V	**Extrem value check:**	yes
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0218, Analog input 2, offset

The analog channels can be processed with a DC offset. It has the unit millivolt, and this value is subtracted from the analog value.

See also the functional description: "Analog Inputs".

P-0-0218 - Attributes

Para. Name:	**DE**	Analog-Eingang 2, Offset		
	EN	Analog input 2, offset		
	FR	Entrée analogique 2, offset		
	ES	Entrada analogica 2, offset		
	IT	Ingresso analogico 2, Offset		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	Phase3
Unit:		V	**Extrem value check:**	yes
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0223, Status Input E-Stop function

This Parameter shows the state of the emergency stop input. The parameter can be used to read back the E-Stop input oder for display in a setup program.

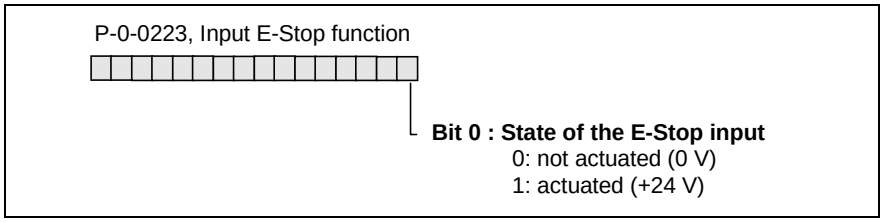

Fig. 3-1: Structure of the parameter P-0-0223, Input E-Stop function

For normal operation of the drive, the hardware input must be actuated with 24V.

See also the functional description: "Emergency stop feature"

P-0-0223 - Attributes

Para. Name:	**DE**	Status E-Stop-Eingang		
	EN	Status Input E-Stop function		
	FR	Etat entrée Arrêt d'urgence		
	ES	Estado entrada parada de emergencia		
	IT	Stato Ingresso E-Stop		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0312, Spindle position 1

Contains the angular position where the drive goes during spindle positioning when the switch inputs are

- POS1 = 0 Volt,
- POS2 = 0 Volt.

See also the functional description: "Spindle positioning".

P-0-0312 - Attributes

Para. Name:	**DE**	Spindel-Position 1		
	EN	Spindle position 1		
	FR	Position broche 1		
	ES	Posición de husillo 1		
	IT	Posizione Mandrino 1		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	P3-4
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0313, Spindle position 2

Contains the angular position where the drive goes during spindle positioning when the switch inputs are

- POS1 = 24 Volt,
- POS2 = 0 Volt.

See also the functional description: "Spindle positioning".

P-0-0313 - Attributes

Para. Name:	**DE**	Spindel-Position 2		
	EN	Spindle position 2		
	FR	Position broche 2		
	ES	Posición de husillo 2		
	IT	Posizione Mandrino 2		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	P3-4
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0314, Spindle position 3

Contains the angular position where the drive goes during spindle positioning when the switch inputs are

- POS1 = 0 Volt,
- POS2 = 24 Volt.

See also the functional description: "Spindle positioning".

P-0-0314 - Attributes

Para. Name:	**DE**	Spindel-Position 3		
	EN	Spindle position 3		
	FR	Position broche 3		
	ES	Posición de husillo 3		
	IT	Posizione Mandrino 3		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	P3-4
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0315, Spindle position 4

Contains the angular position where the drive goes during spindle positioning when the switch inputs are

- POS1 = 24 Volt,
- POS2 = 24 Volt.

See also the functional description: "Spindle positioning".

P-0-0315 - Attributes

Para. Name:	**DE**	Spindel-Position 4		
	EN	Spindle position 4		
	FR	Position broche 4		
	ES	Posición de husillo 4		
	IT	Posizione Mandrino 4		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	P3-4
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0322, Spindle relative offset 1

Contains the relative angular way which the drive performs during relative spindle positioning when the switch inputs are

- POS1 = 0 Volt,
- POS2 = 0 Volt.

See also the functional description: "Spindle positioning".

P-0-0322 - Attributes

Para. Name:	**DE**	Spindelweg 1
	EN	Spindle relative offset 1
	FR	Distance relative de la broche 1
	ES	
	IT	Distanza Mandrino 1

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	P3-4
Unit:	S-0-0076	**Extrem value check:**	yes
Decimal places:	S-0-0077/S-0-0078	**Combination check:**	-
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-0323, Spindle relative offset 2

Contains the relative angular way which the drive performs during relative spindle positioning when the switch inputs are

- POS1 = 24 Volt,
- POS2 = 0 Volt.

See also the functional description: "Spindle positioning".

P-0-0323 - Attributes

Para. Name:	**DE**	Spindelweg 2
	EN	Spindle relative offset 2
	FR	Distance relative de la broche 2
	ES	
	IT	Distanza Mandrino 2

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	P3-4
Unit:	S-0-0076	**Extrem value check:**	yes
Decimal places:	S-0-0077/S-0-0078	**Combination check:**	-
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-0324, Spindle relative offset 3

Contains the relative angular way which the drive performs during relative spindle positioning when the switch inputs are

- POS1 = 0 Volt,
- POS2 = 24 Volt.

See also the functional description: "Spindle positioning".

P-0-0324 - Attributes

Para. Name:	**DE**	Spindelweg 3
	EN	Spindle relative offset 3
	FR	Distance relative de la broche 3
	ES	
	IT	Distanza Mandrino 3

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	P3-4
Unit:	S-0-0076	**Extrem value check:**	yes
Decimal places:	S-0-0077/S-0-0078	**Combination check:**	-
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-0325, Spindle relative offset 4

Contains the relative angular way which the drive performs during relative spindle positioning when the switch inputs are

- POS1 = 24 Volt,
- POS2 = 24 Volt.

See also the functional description: "Spindle positioning".

P-0-0325 - Attributes

Para. Name:	**DE**	Spindelweg 4		
	EN	Spindle relative offset 4		
	FR	Distance relative de la broche 4		
	ES			
	IT	Distanza Mandrino 4		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	P3-4
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	-
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0420, Analog output 1 signal selection

Using **P-0-0420, Analog output 1 signal selection**, an ID no. can be assigned to the analog AK1 output channel of the drive controller. The parameter with the assigned ID no. can be visualized with an oscilloscope in the form of an analog voltage. Only those ID no. which figure in the list **P-0-0426, Analog outputs, IDN list of assignable parameters** can be used.

See also the functional description: "Analog Output".

P-0-0420 - Attributes

Para. Name:	**DE**	Analog-Ausgang 1, Signalauswahl		
	EN	Analog output 1 signal selection		
	FR	Sortie analogique 1, sélection de signal		
	ES	Salida analógica 1, selección de señal		
	IT	Uscita analogica 1, Scelta del Segnale		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0421, Analog output 1, expanded signal selection

To be able to show signals as analog voltages, which are not in the parameter **P-0-0426, Analog outputs, IDN list of assignable parameters**, the option of an expanded signal selection is possible. This becomes active as long as no parameter is assigned via **P-0-0420, Analog output 1 signal selection**.

The following expended signal select options are available:

- expanded signal select with permanently defind signals
- byte output
- bit output

1) Expanded signal selection with fixed signals

Internal signal numbers are assigned which are not in the drive in the form of ID numbers. These signals have permanent units making an evaluation via **P-0-0422, Analog output 1, scaling per 10V full scale** possible. The evaluation factor 1.0 equals the permanent unit. The following permanently defined signals are possible:

Signal number P-0-0421	Output signal	Ref. Unit: scaling factor = 1.0
0x00000001	motor encoder sine signal	0.5V/10V
0x00000002	motor encoder cosine signal	0.5V/10V
0x00000003	Opt. enc. sine signal	0.5V/10V
0x00000004	Opt. enc. sine cosine	0.5V/10V
0x00000005	Position command difference on the pos. controler	rot. =>1000rpm/10V lin. =>100m/min/10V
0x00000006	DC bus power	1kW/10V
0x00000007	absolute DC bus power amount	1kW/10V
0x00000008	effective current	S-0-0110/10V
0x00000009	relative current	S-0-0110/10V
0x0000000a	thermal load	100%/10V, no scaling possible
0x0000000b	motor temperature	150°C/10V
0x0000000c	magnetizing current	S-0-0110/10V
0x0000000d	velocity command at the velocity controller	rot. => 1000rpm/10V lin. => 100m/min/10V

Fig. 3-2: Signal select list with predefined signal selection

The outputs are not scaling dependent, and position and velocity data always refer to the motor shaft.

2) Byte output

It is possible hereby to output memory cells of the data memory as analog voltage. It can only be practically applied if the data storage structure is known. As this is, however, different from version to version, the the function can only be used by the respective developer. The function is activated by setting bit 28 in **P-0-0421, Analog output 1, expanded signal selection**. The adress of the memory cell is defined in the least significant 24 bit of the expanded signal selection.

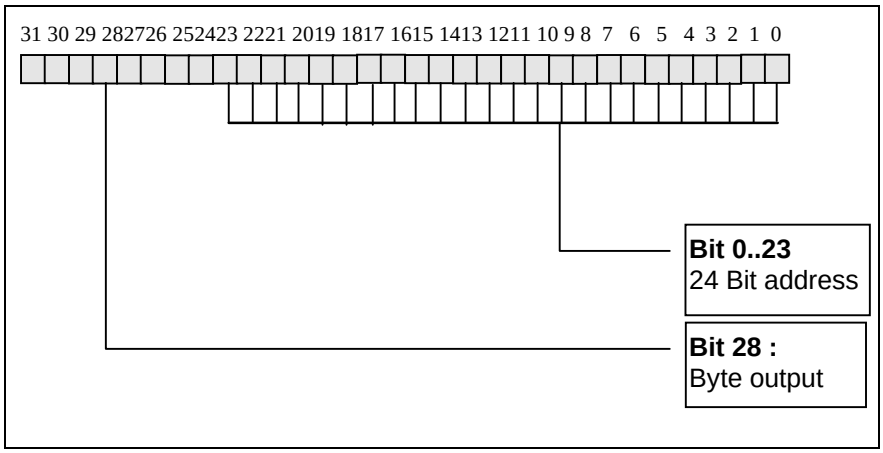

Fig. 3-3: Definition **P-0-0421, Analog output 1, expanded signal selection** with byte output

3) Bit output

Individual bits of the data memory can be shown as analog voltage hereby. If the respective bit is set, then 10V voltage is output at the analog output. A cleared bit outputs -10V. The function is activated by setting bit 29 and inputting the desired memory address in **P-0-0421, Analog output 1, expanded signal selection**.

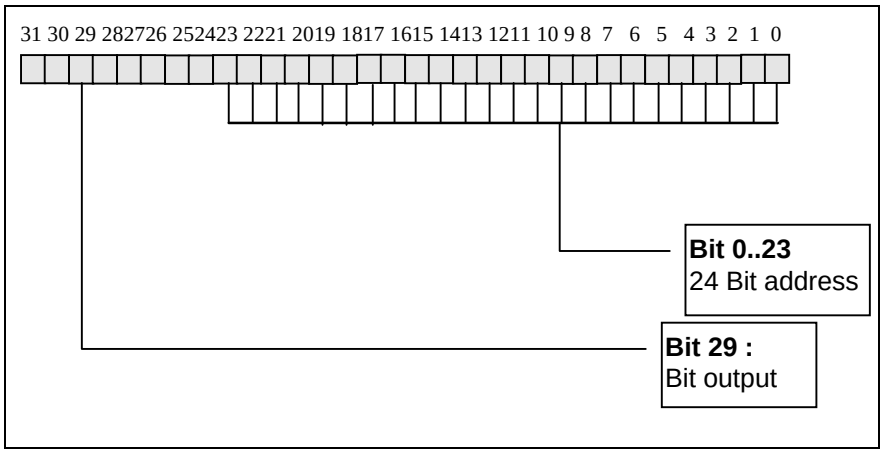

Fig. 3-4: Definition **P-0-0421, Analog output 1, expanded signal selection** with bit output

See also the functional description: "Analog Output".

P-0-0421 - Attributes

Para. Name:	**DE**	Analog-Ausgang 1, erweiterte Signalauswahl
	EN	Analog output 1, expanded signal selection
	FR	Sortie analogique 1, sélection de signal élargie
	ES	Salida analógica 1, selección de señal ampliada
	IT	Uscita analogica 1, Superamento Scelta

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	HEX	**Validity check:**	no
Unit:	--	**Extrem value check:**	no
Decimal places:	--	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-0422, Analog output 1, scaling per 10V full scale

The resolution of the selected signal can be varied with parameter **P-0-0422, Analog output 1 scaling per 10V full scale**. If an ID no. is assigned via **P-0-0420, Analog output 1, signal selection**, the evalution is assigned the same unit as the parameter with the assigned ID number.

The output of pre-defined signals means that the scaling has a decimal factor of 4 decimal places. It has a permanent reference with fixed unit.

The scaling defines the least significant bit for bit and byte outputs. The input is decimal without decimal places.

See also the functional description: "Analog Output".

P-0-0422 - Attributes

Para. Name:	**DE**	Analog-Ausgang 1, Bewertung [1/10V]		
	EN	Analog output 1, scaling per 10V full scale		
	FR	Sortie analogique 1, calibrage [1/10V]		
	ES	Salida analógica 1, calibrado [1/10V]		
	IT	Uscita analogica 1, Scala per 10V fondo scala		
Function:		Parameter	**Editability:**	P234
Data length:		---	**Memory:**	-
Format:		P-0-0420/P-0-0421	**Validity check:**	no
Unit:		P-0-0420/P-0-0421	**Extrem value check:**	no
Decimal places:		P-0-0420/P-0-0421	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0423, Analog output 2, signal selection

Using **P-0-0423, Analog output 2, signal selection**, an ID no. can be assigned to the analog AK2 output channel of the drive controller. The parameter with the assigned ID no. can be visualized with an oscilloscope in the form of an analog voltage. Only those ID no. which figure in the list **P-0-0426, Analog outputs, IDN list of assignable parameters** can be used.

See also the functional description: "Analog Output".

P-0-0423 - Attributes

Para. Name:	**DE**	Analog-Ausgang 2, Signalauswahl		
	EN	Analog output 2, signal selection		
	FR	Sortie analogique 2, sélection de signal		
	ES	Salida analógica 2, selección de señal		
	IT	Uscita analogica 2, Scelta del Segnale		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0424, Analog output 2, expanded signal selection

To be able to show signals as analog voltages, which are not in the parameter **P-0-0426, Analog outputs, IDN list of assignable parameters**, the option of an expanded signal selection is possible. This becomes active as long as no parameter is assigned via **P-0-0423, Analog output 2 signal selection**.

The following expended signal select options are available:

- expanded signal select with permanently defind signals
- byte output
- bit output

1) Expanded signal selection with fixed signals

Internal signal numbers are assigned which are not in the drive in the form of ID numbers. These signals have permanent units making an evaluation via **P-0-0425, Analog output 2, scaling per 10V full scale** possible. The evaluation factor 1.0 equals the permanent unit. The following permanently defined signals are possible:

Signal number P-0-0424	Output signal	Ref. Unit: scaling factor = 1.0
0x00000001	motor encoder sine signal	0.5V/10V
0x00000002	motor encoder cosine signal	0.5V/10V
0x00000003	Opt. enc. sine signal	0.5V/10V
0x00000004	Opt. enc. sine cosine	0.5V/10V
0x00000005	Position command difference on the pos. controler	rot. =>1000rpm/10V lin. =>100m/min/10V
0x00000006	DC bus power	1kW/10V
0x00000007	absolute DC bus power amount	1kW/10V
0x00000008	effective current	S-0-0110/10V
0x00000009	relative current	S-0-0110/10V
0x0000000a	thermal load	100%/10V no scaling possible
0x0000000b	motor temperature	150°C/10V
0x0000000c	magnetizing current	S-0-0110/10V
0x0000000d	velocity command at the velocity controller	rot. =>1000rpm/10V lin. => 100m/min/10V

Fig. 3-5: Signal select list with predefined signal selection

The outputs are not scaling dependent, and position and velocity data refer always to the motor shaft.

2) Byte output

It is possible hereby to output memory cells of the data memory as analog voltage. It can only be practically applied if the data storage structure is known. As this is, however, different from version to version, the the function can only be used by the respective developer. The function is activated by setting bit 28 in **P-0-0424, Analog output 2, expanded signal selection**. The adress of the memory cell is defined in the least significant 24 bit of the expanded signal selection.

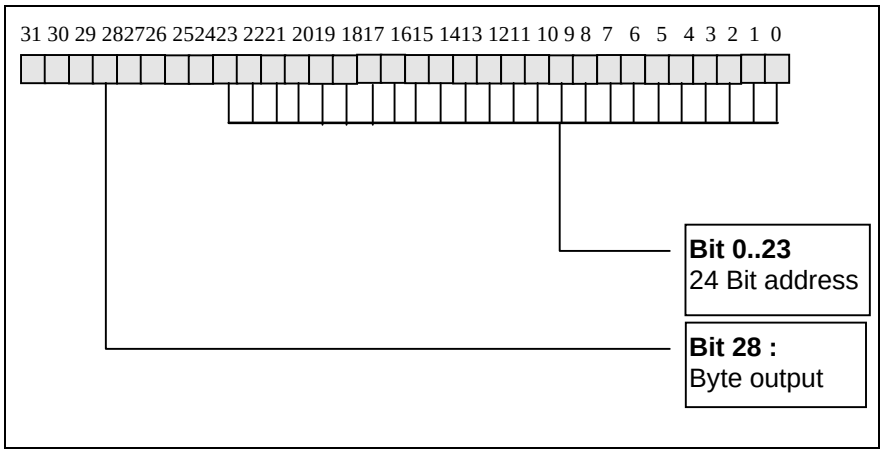

Fig. 3-6: Definition **P-0-0424, Analog output 2, expanded signal selection** with byte output

3) Bit output

Individual bits of the data memory can be shown as analog voltage hereby. If the respective bit is set, then 10V voltage is output at the analog output. A cleared bit outputs -10V. The function is activated by setting bit 29 and inputting the desired memory address in **P-0-0424, Analog output 2, expanded signal selection**.

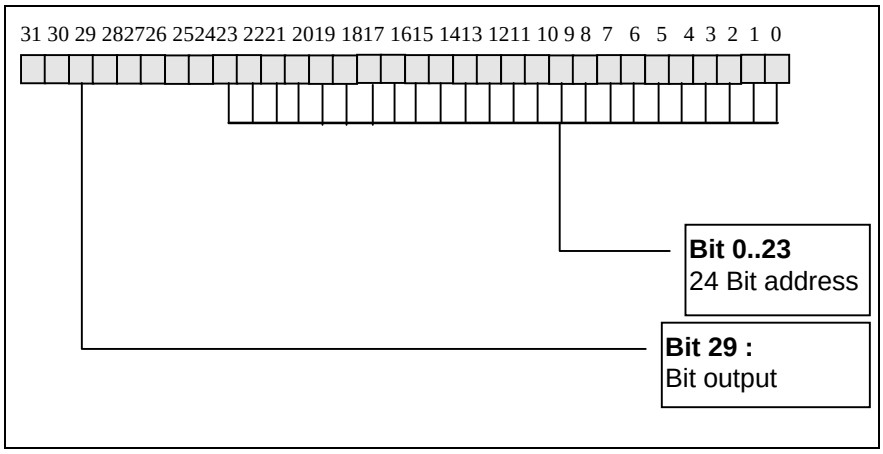

Fig. 3-7: Definition **P-0-0424, Analog output 2, expanded signal selection** with bit output

See also the functional description: "Analog Output".

P-0-0424 - Attributes

Para. Name:	**DE**	Analog-Ausgang 2, erweiterte Signalauswahl
	EN	Analog output 2, expanded signal selection
	FR	Sortie analogique 2, sélection de signal élargie
	ES	Salida analógica 2, selección de señal ampliada
	IT	Uscita analogica 2, Superamento Scelta

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	HEX	**Validity check:**	no
Unit:	--	**Extrem value check:**	no
Decimal places:	--	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-0425, Analog output 2, scaling per 10V full scale

The resolution of the selected signal can be varied with parameter **P-0-0425, Analog output 2 scaling per 10V full scale**. If an ID no. is assigned via **P-0-0423, Analog output 2, signal selection**, the evalution is assigned the same unit as the parameter with the assigned ID number.

The output of pre-defined signals means that the scaling has a decimal factor of 4 decimal places. It has a permanent reference with fixed unit.

The scaling defines the least significant bit for bit and byte outputs. The input is decimal without decimal places.

See also the functional description: "Analog Output".

P-0-0425 - Attributes

Para. Name:	**DE**	Analog-Ausgang 2, Bewertung [1/10V]		
	EN	Analog output 2, scaling per 10V full scale		
	FR	Sortie analogique 2, calibrage [1/10V]		
	ES	Salida analógica 2, calibrado [1/10V]		
	IT	Uscita analogica 2, Scala per 10V fondo scala		
Function:		Parameter	**Editability:**	P234
Data length:			**Memory:**	-
Format:		P-0-0420/P-0-0421	**Validity check:**	no
Unit:		P-0-0420/P-0-0421	**Extrem value check:**	no
Decimal places:		P-0-0420/P-0-0421	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0426, Analog outputs, IDN list of assignable parameters

The parameter P-0-0426, Analog outputs, IDN list of assignable parameters contains a list of all parameters assignable via P-0-0420, Analog output 1 signal selection and P-0-0423, Analog output 2, signal selection.

See also the functional description: "Analog Output".

P-0-0426 - Attributes

Para. Name:	**DE**	Analog-Ausgabe, IDN-Liste der zuweisbaren Parameter		
	EN	Analog outputs, IDN list of assignable parameters		
	FR	Sorties analog., liste des paramètres pouvant être assignés		
	ES	Salida analógica, lista IDN de los números ID asignables		
	IT	Uscite analogiche, Lista IDN dei Parametri assignabili		
Function:		Parameter	**Editability:**	no
Data length:		2Byte var.	**Memory:**	-
Format:		IDN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0502, Encoder emulation, resolution

For the function incremental encoder emulation, the desired resolution of the emulated signal is set here.

The unit depends from the used encoder emulation type.

Incremental encoder emulation:

Resolutions from 1 to 162144 lines/rev can be set.

Absolute encoder emulation:

The resolution for one turn (rev.) can be set from 12 bits to 24 bits.

See also the functional description: "Functional principle: Incremental Encoder Emulation".

P-0-0502 - Attributes

Para. Name:	**DE**	Geber-Emulation Auflösung		
	EN	Encoder emulation, resolution		
	FR	Emulation codeur, résolution		
	ES	Emulación de encoder, resolución		
	IT	Emulazione Encoder, Risoluzione		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		Cycles/Rev	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0503, Marker pulse offset

With this parameter, the position of the reference pulse (zero pulse) of the emulated incremental encoder output can be shifted within one (electr. or mech.) turn.

See also functional description: "Encoder emulation".

P-0-0503 - Attributes

Para. Name:	**DE**	Referenzimpuls-Offset		
	EN	Marker pulse offset		
	FR	Décalage du top 0 pour emul. codeur incr.		
	ES	Desviación impulso de referencia		
	IT	Offset Impulso di Zero		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		Deg	**Extrem value check:**	yes
Decimal places:		4	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0508, Commutation offset

For synchronous motors, this parameter indicates the offset between the raw value of the motor encoder and the resulting absolute electrical angle between the stator current vector and the rotor flux vector.

For motors with motor feedback data memory, like MKD, the commutation offset is stored in the feedback and therefore does not need to be entered.

This value must always be redetermined, if

- the motor probe system encounters a change in its mechanical structure,
- A mechanical restructuring of primary and secondary portions takes place.

For asynchronous motors, this parameter has no meaning.

See also the functional description: "Synchronous-asynchronous".

P-0-0508 - Attributes

Para. Name:	**DE**	Kommutierungs-Offset		
	EN	Commutation offset		
	FR	Offset de commutation		
	ES	Offset de conmutación		
	IT	Offset di Commutazione		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0509, Slot angle

This parameter is not currently available for use.

P-0-0509 - Attributes

Para. Name:	**DE**	Passfedernut-Winkel		
	EN	Slot angle		
	FR	Angle de clavette		
	ES	Angulo de chavetero		
	IT	Angolo di Inserzione		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0510, Moment of inertia of the rotor

This parameter indicates the moment of inertia of the rotor without load. For motors with feedback memory (e.g. MKD), it is saved in the feedback.

See also the functional description: "Motor Feedback-Data Memory".

P-0-0510 - Attributes

Para. Name:	**DE**	Rotor-Trägheitsmoment		
	EN	Moment of inertia of the rotor		
	FR	Couple d'inertie du rotor		
	ES	Par de inercia de rotor		
	IT	Coppia di Inerzia del Rotore		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		kgm²	**Extrem value check:**	no
Decimal places:		5	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0511, Brake current

The brake current is monitored by the drive controller if the motor is equipped with a blocking brake and a value other than 0 is entered in this parameter. If the brake current lies outside the range

(0.4 . . . 1.6) • P-0-0511,

then error message **F268 Brake fault** will be generated.

See also the functional description: "Motor Holding Brake"

P-0-0511 - Attributes

Para. Name:	**DE**	Haltebremsenstrom		
	EN	Brake current		
	FR	Courant frein		
	ES	Corriente de frenado de parada		
	IT	Corrente Freno		
Function:		Parameter	**Editability:**	P23
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		A	**Extrem value check:**	yes
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0518, Amplifier nominal current 2

The parameter specifies the maximum nominal current of the amplifier at reduced peak current.

It specifies together with the parameters

- **S-0-0110, Amplifier peak current**
- **S-0-0112, Amplifier nominal current**
- **P-0-0519, Amplifier peak current 2**

the length of the peak current characteristics line for the peak current limit of the amplifier.

No value can be entered, since it is permanently programmed within the amplifier.

P-0-0518 - Attributes

Para. Name:	**DE**	Verstärker-Nennstrom 2		
	EN	Amplifier nominal current 2		
	FR	Courant nominal variateur 2		
	ES	Amplificador corriente nominal 2		
	IT	Corrente Nominale Azionamento 2		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		A	**Extrem value check:**	yes
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0519, Amplifier peak current 2

The drive allows you to define a different continuous peak current characteristic line with reduced amplifier peak current, and therefore an increased amplifier continuous current.

Parameter P-0-0519 specifies an amplifier peak current for this case.

It determines the working points on the peak current characteristic line.

No value for this parameter can be entered, since it is permanently programmed in the amplifier.

P-0-0519 - Attributes

Para. Name:	**DE**	Verstärker-Spitzenstrom 2		
	EN	Amplifier peak current 2		
	FR	Courant crête variateur 2		
	ES	Amplificador corriente punta 2		
	IT	Corrente di Picco Azionamento 2		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		A	**Extrem value check:**	yes
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0523, Commutation, probe value

If the commutation offset for linear synchronous motors is to be set with the **P-0-0524, Commutation adjustment command**, then the setting probe value should be entered in the **P-0-0523, Commutation, probe value** parameter.

See also the functional description: "Determining the commutation offset".

P-0-0523 - Attributes

Para. Name:	**DE**	Kommutierungseinstellung Messwert		
	EN	Commutation, probe value		
	FR	Mesure reglage de commutation		
	ES	Ajuste de conmutación, valor de medición		
	IT	Commutazione, Valore di Probe		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		S-0-0076	**Extrem value check:**	yes
Decimal places:		S-0-0077/S-0-0078	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0524, D300 Commutation adjustment command

Parameter P-0-0524 can activate the command for setting the commutator offset. The command can only be used when:

- the appropriate password is entered
- torque control mode is active
- drive enable is on

If these criteria are met, the drive will automatically set the appropriate commutator offset for synchronous motors.

See also the functional description: "Determining the commutation offset"

P-0-0524 - Attributes

Para. Name:	**DE**	D300 Kommando Kommutierungseinstellung		
	EN	D300 Commutation adjustment command		
	FR	D300 Commande reglage de commutation		
	ES	D300 Comando ajuste de conmutación		
	IT	D300 Commutazione - Comando		
Function:		Command	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0525, Type of motor brake

This parameter specifies whether an electrically released or electrically engaged brake is being used. If an **MHD** or **MDK** motor is used, then the brake will be electrically released, if there is one. The bit 0 will be set automatically to 0. If other motor types are used, this bit must be entered during the startup procedure.

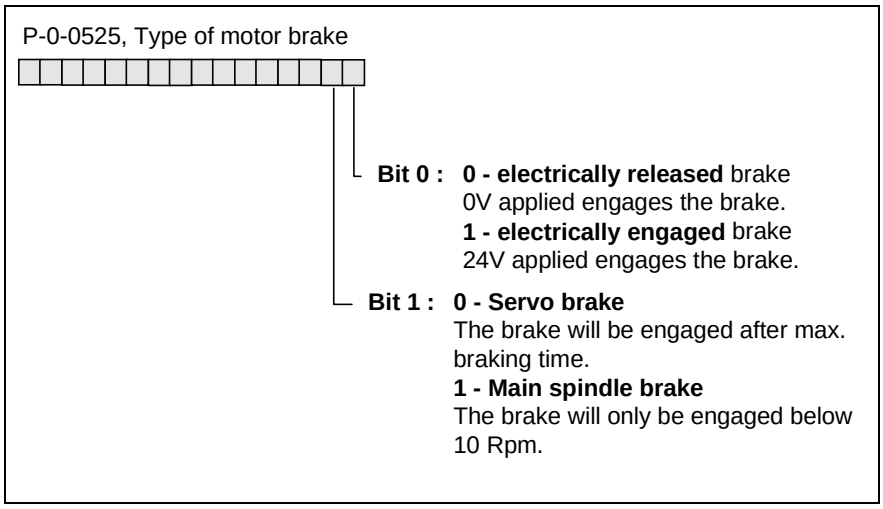
P-0-0525, Type of motor brake
Bit 0 : 0 - electrically released brake
0V applied engages the brake.
1 - electrically engaged brake
24V applied engages the brake.
Bit 1 : 0 - Servo brake
The brake will be engaged after max. braking time.
1 - Main spindle brake
The brake will only be engaged below 10 Rpm.

Fig. 3-8: Setting the type of motor brake

See also the functional description: "Motor Holding Brake".

P-0-0525 - Attributes

Para. Name:	**DE**	Haltebremsentyp		
	EN	Type of motor brake		
	FR	Type de frein		
	ES	Tipo de freno de motor		
	IT	Tipo di Freno		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0526, Brake control delay

If a holding brake is used, the time delay between the activation of the brake and the time when it gets its full force must be set in this parameter.

It must be sure that the drive is still electrically controlled as long as the brake does not grip firmly.

This value is entered automatically when MHD, MKD or MKE motors are used. When using Indramat brakes in conjunction with asynchronous motors, then the standard value to be entered is 150 ms.

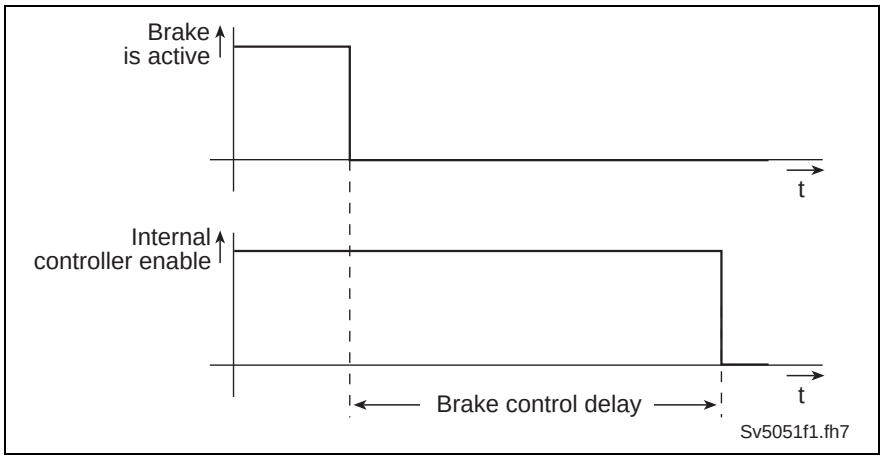

Fig. 3-9: Brake control delay

See also the functional description: "Motor Holding Brake".

P-0-0526 - Attributes

Para. Name:	**DE**	Haltebremsen-Verzugszeit		
	EN	Brake control delay		
	FR	Délai frein		
	ES	Retardo de freno		
	IT	Ritardo Freno		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		ms	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0530, Slip increase

In an asynchronous motor, the rotor resistance and consequently the rotor time constant changes with the temperature. The slip increase compensates for this change.

The slip increase per 100K(elvin) is motor-specific and is specified by Indramat for each individual motor.

See also the functional description: "Asynchronous motors".

P-0-0530 - Attributes

Para. Name:	**DE**	Schlupfanhebung		
	EN	Slip increase		
	FR	Accroissement de glissement par température		
	ES	Aumento de deslizamiento		
	IT	Incremento Slip		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		1/100K	**Extrem value check:**	yes
Decimal places:		2	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0531, Stall current factor

The stall current limit is used to limit the peak current of the motor to reasonable values when operating at high velocities. Higher currents lead only to higher losses, not to more wave power.

This limit value is set by Indramat. If 0 is entered, the limit is inactive.

See also the functional description: "Asynchronous motors".

P-0-0531 - Attributes

Para. Name:	**DE**	Kippstromfaktor		
	EN	Stall current factor		
	FR	Facteur de courant bascule		
	ES	Factor de corriente de volcado		
	IT	Fattore di Corrente di Inversione		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		A/Vmin	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0532, Premagnetization factor

The pre-magnetization factor is used for application-dependent decreases in the Servo magnetization current. Together with parameter **P-0-4004, Magnetizing current**, it specifies the motor's magnetization current.

Effective magnetization current =

magnetization current • pre-magnetization scaling factor

With a pre-magnetizing factor of 100%, the Servo magnetization current in the motor will flow so that a torque proportional to the momentum-producing current will result in the basic rotation range.

See also the functional description: "Scaling factor pre-magnetizing".

P-0-0532 - Attributes

Para. Name:	**DE**	Vormagnetisierungsfaktor		
	EN	Premagnetization factor		
	FR	Facteur de pré-magnétisation		
	ES	Factor de magnetización previa		
	IT	Fattore di Premagnetizzazione		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		%	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0533, Flux loop prop. gain

The flux loop controls the magnetization current in the field-weakening range.

The parameter value is set by Indramat.

See also the functional description: "Asynchronous motors".

P-0-0533 - Attributes

Para. Name:	**DE**	Feldregler Prop.verst.		
	EN	Flux loop prop. gain		
	FR	Gain prop. de l'asservissement de flux		
	ES	Regulador de campo amplificación proporcional		
	IT	Guadagno prop. Anello di Flusso		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		A/V	**Extrem value check:**	yes
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0534, Flux loop integral action time

The flux loop controls the magnetization current in the field-weakening range.

The parameter value is set by Indramat.

See also the functional description: "Asynchronous motors".

P-0-0534 - Attributes

Para. Name:	**DE**	Feldregler Nachstellzeit		
	EN	Flux loop integral action time		
	FR	Part intégrale de l'asservissement de flux		
	ES	Regulador de campo tiempo de reajuste		
	IT	Tempo Integrazione Anello di Flusso		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		ms	**Extrem value check:**	yes
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0535, Motor voltage at no load

The motor voltage in the field-weakening range is set so that it reaches a value lower than or equal to the DC bus voltage.

Under load, the motor voltage will be raised to the maximum motor voltage.

See also the functional description: "Asynchronous motors".

P-0-0535 - Attributes

Para. Name:	**DE**	Motorleerlaufspannung		
	EN	Motor voltage at no load		
	FR	Tension moteur á vide		
	ES	Tension de marcha en vacio de motor		
	IT	No Carico Tensione Motore		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		%Uzwk	**Extrem value check:**	yes
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0536, Motor voltage max.

The motor voltage in the field-weakening range is set so that it reaches a value lower than or equal to the DC bus voltage.

At full load, the motor voltage will rise to the maximum motor voltage. The output voltage will be sinusoidal up to a value of 90% .

See also the functional description: "Asynchronous motors".

P-0-0536 - Attributes

Para. Name:	**DE**	Motormaximalspannung		
	EN	Motor voltage max.		
	FR	Tension max. moteur		
	ES	Tensión máxima de motor		
	IT	Tensione Motore massima		
Function:		Parameter	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		%Uzwk	**Extrem value check:**	yes
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0537, S1-Kink-speed

From the S1 kink speed on, core losses result in.a drop in power. This motor-specific velocity determined by Indramat is only useful for the "S1 operating mode". From this velocity on, the field is weakened early enough as to keep the motor temperature low.

See also the functional description: "Asynchronous motors".

P-0-0537 - Attributes

Para. Name:	**DE**	S1-Eckdrehzahl
	EN	S1-Kink-speed
	FR	Vitesse coin S1
	ES	S1-N.d.r. angular
	IT	S1 Velocità di Curvatura

Function:	Parameter	**Editability:**	P234
Data length:	4Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	Rpm	**Extrem value check:**	yes
Decimal places:	4	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-0538, Motor function parameter 1

Bit 0: 1 = Function S1 Operation active

Bit 1: 1 = field weakneing range for synchronous motor active

Bit 8: 1 = velocity loop control shut down

Attention: Danger of life! Danger from run away axis!

If the velocity control loop monitor is shut down, then the drive no longer monitors the axis as to whether the velocity command value is being maintained or not. This means, for example, with an incorrect parametrization it can occur that the axis move even though such is not wanted. This is a situation that can endanger the life of personnel!

See also the functional description: "Velocity Control Loop Monitoring"

See also the functional description: "S1-Operation Function"

P-0-0538 - Attributes

Para. Name:	**DE**	Motorfunktionsparameter 1
	EN	Motor function parameter 1
	FR	Paramètre de fonctions 1 moteur
	ES	Parámetro de funciones 1 de motor
	IT	Parametro Funzioni 1 Motore

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	BIN	**Validity check:**	Phase3
Unit:	---	**Extrem value check:**	no
Decimal places:	--	**Combination check:**	yes
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-0600, Scaling factor acceleration analog output

If acceleration has been selected in parameters **P-0-038/P-0-0039, Signal select analog output channel 1/2**, then parameter **P-0-0600** sets the scaling factor for it.

The unit rad/s^2 hereby always relates to the motor. Any given gear ratio is not taken into account.

See functional description: "Analog output".

P-0-0600 - Attributes

Para. Name:	**DE**	Wichtung Beschleunigung für Analogausgabe		
	EN	Scaling factor acceleration analog output		
	FR	Calibrage accélération pour sortie analogique		
	ES	Calibrado aceleración para salida analógica		
	IT	Scala Accelerazione per Uscita analogica		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		rad/s²	**Extrem value check:**	yes
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-0601, Scaling factor acceleration power analog output

If acceleration power is set in **P-0-0038/P-0-0039, Signal select analog output channel 1/2**, then their scaling is set with parameter P-0-0601.

The unit rad^2/s^3 always refers to the motor. Any existing gear ratio is not taken into account.

Note: The signal „Acceleration power“ represents the acceleration power P_{acc} output to the motor shaft during accel. or decel., when the measured value (rad^2/s^3) is multiplied with the entire moment of inertia of spindle and motor!

See also the functional description: "Analog output".

P-0-0601 - Attributes

Para. Name:	**DE**	Wichtung Beschleunigungsleistung Analogausgabe		
	EN	Scaling factor acceleration power analog output		
	FR	Calibrage puissance d'accél. sortie analogique		
	ES	Calibrado potencia de aceleración salida analógica		
	IT	Scala Potenza per Uscita analogica		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		rad²/s^3	**Extrem value check:**	yes
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-1111, Switchable velocity limit 1

The velocity command value is limited to the value in this parameter if the switching inputs are

- LIMIT1 = 24 Volt
- LIMIT2 = 0 Volt
- LIMIT4 = 0 Volt.

The limits specified by **S-0-0113, Maximum motor speed (nmax)** and **S-X-0091, Bipolar velocity limit value** remain.

As long as the actual value exceeds the value in this parameter the message N<LIMIT is generated.

If actual velocity reaches the value in this parameter, then message N=LIMIT is generated.

See also the functional description: "Limiting Velocity"

P-0-1111 - Attributes

Para. Name:	**DE**	Zuschaltbarer Geschwindigkeitsgrenzwert 1		
	EN	Switchable velocity limit 1		
	FR	Vitesse limite enclencheable 1		
	ES	Valor límite de velocidad conmutable 1		
	IT	Velocità limite inseribile 1		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-1112, Switchable velocity limit 2

The velocity command value is limited to the value in this parameter if the switching inputs are

- LIMIT1 = 0 Volt
- LIMIT2 = 24 Volt
- LIMIT4 = 0 Volt.

The limits specified by **S-0-0113, Maximum motor speed (nmax)** and **S-X-0091, Bipolar velocity limit value** remain.

As long as the actual value exceeds the value in this parameter the message N<LIMIT is generated.

If actual velocity reaches the value in this parameter, then message N=LIMIT is generated.

See also the functional description: "Limiting Velocity"

P-0-1112 - Attributes

Para. Name:	**DE**	Zuschaltbarer Geschwindigkeitsgrenzwert 2		
	EN	Switchable velocity limit 2		
	FR	Vitesse limite enclencheable 2		
	ES	Valor límite de velocidad conmutable 2		
	IT	Velocità limite inseribile 2		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-1113, Switchable velocity limit 3

The velocity command value is limited to the value in this parameter if the switching inputs are

- LIMIT1 = 24 Volt
- LIMIT2 = 24 Volt
- LIMIT4 = 0 Volt.

The limits specified by **S-0-0113, Maximum motor speed (nmax)** and **S-X-0091, Bipolar velocity limit value** remain.

As long as the actual value exceeds the value in this parameter the message N<LIMIT is generated.

If actual velocity reaches the value in this parameter, then message N=LIMIT is generated.

See also the functional description: "Limiting Velocity"

P-0-1113 - Attributes

Para. Name:	**DE**	Zuschaltbarer Geschwindigkeitsgrenzwert 3		
	EN	Switchable velocity limit 3		
	FR	Vitesse limite enclencheable 3		
	ES	Valor límite de velocidad conmutable 3		
	IT	Velocità limite inseribile 3		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-1114, Switchable velocity limit 4

The velocity command value is limited to the value in this parameter if the switching inputs are

- LIMIT1 = 0 Volt
- LIMIT2 = 0 Volt
- LIMIT4 = 24 Volt.

The limits specified by **S-0-0113, Maximum motor speed (nmax)** and **S-X-0091, Bipolar velocity limit value** remain.

As long as the actual value exceeds the value in this parameter the message N<LIMIT is generated.

If actual velocity reaches the value in this parameter, then message N=LIMIT is generated.

See also the functional description: "Limiting Velocity"

P-0-1114 - Attributes

Para. Name:	**DE**	Zuschaltbarer Geschwindigkeitsgrenzwert 4		
	EN	Switchable velocity limit 4		
	FR	Vitesse limite enclencheable 4		
	ES	Valor límite de velocidad conmutable 4		
	IT	Velocità limite inseribile 4		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-1115, Switchable velocity limit 5

The velocity command value is limited to the value in this parameter if the switching inputs are

- LIMIT1 = 24 Volt
- LIMIT2 = 0 Volt
- LIMIT4 = 24 Volt.

The limits specified by **S-0-0113, Maximum motor speed (nmax)** and **S-X-0091, Bipolar velocity limit value** remain.

As long as the actual value exceeds the value in this parameter the message N<LIMIT is generated.

If actual velocity reaches the value in this parameter, then message N=LIMIT is generated.

See also the functional description: "Limiting Velocity"

P-0-1115 - Attributes

Para. Name:	**DE**	Zuschaltbarer Geschwindigkeitsgrenzwert 5		
	EN	Switchable velocity limit 5		
	FR	Vitesse limite enclencheable 5		
	ES	Valor límite de velocidad conmutable 5		
	IT	Velocità limite inseribile 5		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-1116, Switchable velocity limit 6

The velocity command value is limited to the value in this parameter if the switching inputs are

- LIMIT1 = 0 Volt
- LIMIT2 = 24 Volt
- LIMIT4 = 24 Volt.

The limits specified by **S-0-0113, Maximum motor speed (nmax)** and **S-X-0091, Bipolar velocity limit value** remain.

As long as the actual value exceeds the value in this parameter the message N<LIMIT is generated.

If actual velocity reaches the value in this parameter, then message N=LIMIT is generated.

See also the functional description: "Limiting Velocity"

P-0-1116 - Attributes

Para. Name:	**DE**	Zuschaltbarer Geschwindigkeitsgrenzwert 6		
	EN	Switchable velocity limit 6		
	FR	Vitesse limite enclencheable 6		
	ES	Valor límite de velocidad conmutable 6		
	IT	Velocità limite inseribile 6		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-1117, Switchable velocity limit 7

The velocity command value is limited to the value in this parameter if the switching inputs are

- LIMIT1 = 24 Volt
- LIMIT2 = 24 Volt
- LIMIT4 = 24 Volt.

The limits specified by **S-0-0113, Maximum motor speed (nmax)** and **S-X-0091, Bipolar velocity limit value** remain.

As long as the actual value exceeds the value in this parameter the message N<LIMIT is generated.

If actual velocity reaches the value in this parameter, then message N=LIMIT is generated.

See also the functional description: "Limiting Velocity"

P-0-1117 - Attributes

Para. Name:	**DE**	Zuschaltbarer Geschwindigkeitsgrenzwert 7		
	EN	Switchable velocity limit 7		
	FR	Vitesse limite enclencheable 7		
	ES	Valor límite de velocidad conmutable 7		
	IT	Velocità limite inseribile 7		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-1136, C-Axis velocity command value

If input EXT POS on DEA04.2M = 24 volts, then the speed command value is not taken directly from analog input 1 but rather parameter **P-0-1136, C-Axis velocity command value**.

See also the functional description: "Transition of Analog Input for C-Axis Mode"

P-0-1136 - Attributes

Para. Name:	**DE**	C-Achse Geschwindigkeits-Sollwert		
	EN	C-Axis velocity command value		
	FR	C-Axis Valeur de commande de vitesse		
	ES	C-Axis Valor nominal de velocidad		
	IT	C-Axis Valore di Velocità comandato		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-1201, Ramp 1 pitch

The parameter **P-0-1201, Ramp 1 pitch**, takes effect in

- "Velocity control" operating mode and
- during the **error response** "Velocity command value zero-switch with pitch and filter".

The acceleration and delay entered here are used to create a pitch starting from the last effective command value to the new command value.

In the Velocity control operating mode, the resulting velocity command value is derived from the sum of the value resulting from the pitch function in **S-0-0036, Velocity command value** and the direct value in **S-0-0037, Additive velocity command value**.

During the error response "Velocity command value, zero-switch with pitch and filter", velocity proceeds from the current feedback velocity to 0, using the effective velocity command value with the delay specified by the parameter in **P-0-1201, Ramp 1 pitch**.

Note: With the value in the parameter P-0-1201, Ramp 1 pitch = 0, the ramp is not active.

See also the functional description: "Velocity command value to zero with filter and ramp".

P-0-1201 - Attributes

Para. Name:	**DE**	Steigung Rampe 1		
	EN	Ramp 1 pitch		
	FR	Montée Rampe 1		
	ES	Rampa de velocidad 1		
	IT	Velocità Rampa 1		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0160	**Extrem value check:**	yes
Decimal places:		S-0-0161/S-0-0162	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-1202, Final speed of ramp 1

At the speed in the parameter **P-0-1202 Final speed of ramp1**, the slope of the drive internal speed command ramp changes from **Ramp 1 pitch (P- 0-1201)** to **Ramp 2 pitch (P-0-1203)**.

See also the functional description: "Velocity command value to zero with filter and ramp".

P-0-1202 - Attributes

Para. Name:	**DE**	Endgeschwindigkeit Rampe 1		
	EN	Final speed of ramp 1		
	FR	Rampe 1, vitesse finale		
	ES	Velocidad final rampa 1		
	IT	Velocità di Transizione Rampa 1		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0044	**Extrem value check:**	yes
Decimal places:		S-0-0045/S-0-0046	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-1203, Ramp 2 pitch

The parameter **P-0-1203, Ramp 2 pitch**, takes effect in

- "Velocity control" operating mode and
- during the error response "Velocity command value zero-switch with pitch and filter".

The acceleration and deceleration entered here are used to create a pitch starting from the last effective command value to the new command value, as long as the speed at the ramp output is higher than the value in the parameter **P-0-1202, Final speed of ramp 1**.

In the Velocity control operating mode, the resulting velocity command value is derived from the sum of the value resulting from the pitch function in **S-0-0036, Velocity command value** and the direct value in **S-0-0037, Additive velocity command value**.

During the error response "Velocity command value, zero-switch with pitch and filter", velocity proceeds from the current feedback velocity to 0, using the effective velocity command value with the delay specified by the parameter in **P-0-1203, Ramp 2 pitch**.

Note: With the value in the parameter P-0-1201, Ramp 1 pitch = 0, the ramp is not active.

See also the functional description: "Velocity command value to zero with filter and ramp".

P-0-1203 - Attributes

Para. Name:	**DE**	Steigung Rampe 2		
	EN	Ramp 2 pitch		
	FR	Montée Rampe 2		
	ES	Rampa de velocidad 2		
	IT	Velocità Rampa 2		
Function:		Parameter	**Editability:**	P234
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		S-0-0160	**Extrem value check:**	yes
Decimal places:		S-0-0161/S-0-0162	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-1222, Velocity command filter

The parameter **P-0-1222, Velocity command filter** works

- in the Velocity control operating mode and
- during the error response "Velocity command value zero-switch with slope and filter."

The time constant entered here is used in the velocity control operating mode to pass the value in **S-0-0036, Velocity command value** which has been pitched by **P-0-1201, Ramp 1 pitch**, through a deep-pass filter. This serves to diminish surges in acceleration over the course of command values.

The resulting velocity command value results from the sum of the sloped and filtered value in **S-0-0036, Velocity command value** and the direct value in **S-0-0037, Additive velocity command value**.

When error response "Velocity command value, zero-switch with pitch and filter" is executed, velocity proceeds from the current feedback velocity to 0, using the effective velocity command value with the delay specified by the parameter in **P-0-1201, Ramp 1 pitch**. It is also passes through the deep pass filter specified by **P-0-1222, Velocity command filter**.

See also the functional description: "Velocity command value to zero with filter and ramp".

P-0-1222 - Attributes

Para. Name:	**DE**	Geschwindigkeits-Sollwert-Filter
	EN	Velocity command filter
	FR	Filtrage de consigne vitesse
	ES	Filtro para valor nominal de velocidad
	IT	Filtro su Velocità comandata

Function:	Parameter	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	ms	**Extrem value check:**	yes
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-1292, Switchable torque limit value

If input MD-RED on DEA04.2M = 24 volts, then the internal torque command is additionally limited by the value P-x-1292 switchable torque limit value.

The existing limits set by parameters

- **S-0-0092, Bipolar torque/force limit value**

and

- **P-0-0109, Torque/force peak limit**

remain active.

P-x-1292 is present in every parameter block at least once.

level at MD-RED	Active parameter block	Limited by P-x-1292
0 Volt	irrelevant	none
24 Volt	0 to 3	P-0-1292 to P-3-1292

Fig. 3-10: Switchable torque limits that can be selected

See also the functional description: "Switchable torque limits".

P-0-1292 - Attributes

Para. Name:	**DE**	Zuschaltbarer Drehmoment-Grenzwert
	EN	Switchable torque limit value
	FR	Limite de couple enclencheable
	ES	Límite de par de giro conmutable
	IT	Limite di Coppia inseribile

Function:	Parameter	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	DEC_MV	**Validity check:**	Phase3
Unit:	S-0-0086	**Extrem value check:**	yes
Decimal places:	S-0-0086	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-1307, Message 90% load

Description:

Bit 0 of parameter goes to "1" if drive load exceeds 90% of maximum load, i.e., there is less than 10% reserve.

P-0-1307 - Attributes

Para. Name:	**DE**	Meldung 90% Last		
	EN	Message 90% load		
	FR	Alerte 90% de charge		
	ES	Mensaje 90%		
	IT	Preallarme 90% carga		
Function:		Parameter	**Editability:**	no
Data length:			**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-4000, Current-zero-trim phase U

This parameter serves to display the determined result of the zero-trim procedure for the current feedback sensor of phase U.

P-0-4000 - Attributes

Para. Name:	**DE**	Strommess-Nullabgleich Phase U		
	EN	Current-zero-trim phase U		
	FR	Reglage courant nul phase U		
	ES	Compensación cero de medición de corriente fase U		
	IT	Regolazione Corrente 0 Fase U		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		%	**Extrem value check:**	yes
Decimal places:		2	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-4001, Current-zero-trim phase V

This parameter serves to display the determined result of the zero-trim procedure for the current feedback sensor of phase V.

P-0-4001 - Attributes

Para. Name:	**DE**	Strommess-Nullabgleich Phase V		
	EN	Current-zero-trim phase V		
	FR	Reglage courant nul phase V		
	ES	Compensación cero de medición de corriente fase V		
	IT	Regolazione Corrente 0 Fase V		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:		%	**Extrem value check:**	yes
Decimal places:		2	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-4002, Current-amplify-trim phase U

For trimming of the current sensor regarding its gain error, this parameter is determined in the test area for the Indramat drive controllers.

P-0-4002 - Attributes

Para. Name:	**DE**	Strommess-Verst.abgleich Phase U		
	EN	Current-amplify-trim phase U		
	FR	Reglage amplification courant phase U		
	ES	Compensación de amplif. de medición de corriente fase U		
	IT	Regolaz. Aplif. Corrente Fase U		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		4	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-4003, Current-amplify-trim phase V

For trimming of the current sensor regarding its gain error, this parameter is determined in the test area for the Indramat drive controllers.

P-0-4003 - Attributes

Para. Name:	**DE**	Strommess-Verst.abgleich Phase V		
	EN	Current-amplify-trim phase V		
	FR	Reglage amplification courant phase V		
	ES	Compensación de amplif. de medición de corriente fase V		
	IT	Regolaz. Amplif. Corrente Fase V		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		4	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-4004, Magnetizing current

This parameter indicates the nominal or servo-magnetization current set by Indramat **for asynchronous motors**. The magnetizing current actually flowing is also dependent on the premagnetization scaling factor.

For synchronous motors, e.g. MKD, this parameter is automatically set to 0.

See also the functional description: "Asynchronous motors".

P-0-4004 - Attributes

Para. Name:	**DE**	Magnetisierungsstrom
	EN	Magnetizing current
	FR	Courant de magnétisation
	ES	Corriente de magnetización
	IT	Corrente di Magnetizzazione

Function:	Parameter	**Editability:**	P23
Data length:	4Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	A	**Extrem value check:**	yes
Decimal places:	4	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-4011, Switching frequency

This parameter is used to set the switching frequency of the pulse with modulation controller to **4 kHz or 8 kHz**.

See also the functional description: "Setting the Active Continuous Current".

P-0-4011 - Attributes

Para. Name:	**DE**	Schaltfrequenz
	EN	Switching frequency
	FR	Fréquence de coupure
	ES	Frecuencia de conexión
	IT	Frequenza di Commutazione

Function:	Parameter	**Editability:**	P23
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	kHz	**Extrem value check:**	yes
Decimal places:	0	**Combination check:**	yes
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-4012, Slip factor

The slip factor is the most important parameter for asynchronous motors. It indicates the rotor frequency in relation to the torque-producing current. The lower the rotor time constant is, the higher the slip factor.

This parameter is set motor-specifically by Indramat.

See also the functional description: "Asynchronous motors".

P-0-4012 - Attributes

Para. Name:	**DE**	Schlupffaktor
	EN	Slip factor
	FR	Facteur de glissement
	ES	Factor de deslizamiento
	IT	Fattore di Slip

Function:	Parameter	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	Hz/100A	**Extrem value check:**	yes
Decimal places:	2	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-4014, Motor type

The motor type can be selected with this parameter. The following motor types are supported:

- 1: MHD
- 2: 2AD / 1MB with NTC sensor
- 3: LSF
- 4: LAR / LAF
- 5: MKD / MKE
- 6: 2AD /1MB with PTC sensor
- 7: synchronous kit motor

See also the functional description: "Setting of the Motor Type Through P-0-4014, Motor Type".

P-0-4014 - Attributes

Para. Name:	**DE**	Motorart		
	EN	Motor type		
	FR	Type de moteur		
	ES	Tipo de motor		
	IT	Tipo Motore		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		--	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-4015, Intermediate DC bus voltage

The intermediate voltage of the DC bus is stored in the amplifier as a parameter.

The parameter cannot be edited and is only for display and for internal calculations (PWM).

P-0-4015 - Attributes

Para. Name:	**DE**	Zwischenkreisspannung		
	EN	Intermediate DC bus voltage		
	FR	Tension du circuit intermédiaire CD		
	ES	Tensión de circuito intermedio		
	IT	Tensione sul Bus DC		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		V	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-4020, Encoder emulation type

The parameter gives the choice

- between **incremental or absolute** feedback position output as well as
- the **source** of the signal to emulate.

The following table shows the possible combinations:

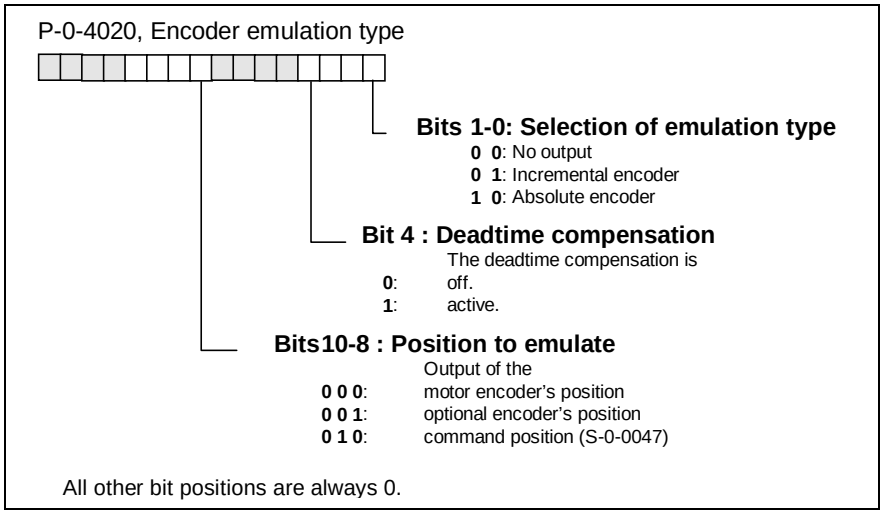
P-0-4020, Encoder emulation type
Bits 1-0: Selection of emulation type
0 0: No output
0 1: Incremental encoder
1 0: Absolute encoder
Bit 4 : Deadtime compensation
The deadtime compensation is
0: off.
1: active.
Bits10-8 : Position to emulate
Output of the
0 0 0: motor encoder's position
0 0 1: optional encoder's position
0 1 0: command position (S-0-0047)
All other bit positions are always 0.

Fig. 3-11: Parameter P-0-4020, Encoder Emulation Type

See also the functional description:"Encoder Emulation".

P-0-4020 - Attributes

Para. Name:	**DE**	Geberemulationsart		
	EN	Encoder emulation type		
	FR	Type d'émulation codeur		
	ES	Tipo de emulación de encoder		
	IT	Tipo di Emulazione Encoder		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	P3-4
Unit:		--	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	-
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-4021, Baud rate RS-232/485

Various baud rates (transmission speeds) can be set for communications via the serial interfaces.

Baud rate [Baud]	Setting in parameter P-0-4021
9600	0
19200	1

Fig. 3-12: Settable baud rates

ATTENTION

⇒ All participants on the bus must be set to the same baud rate.

Note: Do not change the baud rate in the list of all parameters in *DriveTop*. Doing so would lock out all further communications in *DriveTop* versions < 3.

See also Supplement A: "Serial communications".

P-0-4021 - Attributes

Para. Name:	**DE**	Baud-Rate RS-232/485		
	EN	Baud rate RS-232/485		
	FR	Baud-Rate RS-232/485		
	ES	Frecuencia de baudios RS-232/485		
	IT	Baud Rate RS-232/485		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-4022, Drive address

When communicating via **RS485** interface with more than one drive, every drive must have a different address, so that only the addressed drive responds.

Note: If you enter the into the communication parameter P-0-4022 the value 256, it's the address switches which determine the device address (1..99) for the serial communication (RSKO + SIS) and not the value 256.

ATTENTION

If you set the **address via the serial interface** instead of the switches, **only one drive** may be connected at a time.

Only as soon as the addresses are set, you can connect the entire bus.

See also Supplement A: "Serial communications".

P-0-4022 - Attributes

Para. Name:	**DE**	Antriebsadresse		
	EN	Drive address		
	FR	Adresse entraînement		
	ES	Dirección de accionamiento		
	IT	Indirizzo Azionamento		
Function:		Parameter	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-4023, C400 Communication phase 2 transition

Switching command **from drive mode** or from phase 3 (P3) **to parameter mode**, Phase 2 (P2).

The command can only be processed when the **drive enable** is **off**.

See also the functional description: "Parametrization Mode - Operating Mode".

P-0-4023 - Attributes

Para. Name:	**DE**	C400 Umschaltung auf Komm.-Phase 2		
	EN	C400 Communication phase 2 transition		
	FR	C400 Passage en phase 2		
	ES	C400 Conmutación a fase 2		
	IT	C400 Comando Selezione Modo Parametri		
Function:		Command	**Editability:**	P234
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-4035, Trim-current

In this parameter, the current value is stored with which the **current measurement** of the drive control is precisely adjusted in the factory. This eliminates systematical errors in the current measurement. The value has no meaning to the user and **cannot be changed.**

P-0-4035 - Attributes

Para. Name:	**DE**	Abgleichstrom
	EN	Trim-current
	FR	Courant pour le calibrage
	ES	Corriente para calibrar
	IT	Corrente per calibrare

Function:	Parameter	**Editability:**	no
Data length:	4Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	Phase3
Unit:	A	**Extrem value check:**	yes
Decimal places:	3	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-4045, Active permanent current

This parameter shows how much current the drive can supply in the actual cmbination in continual operation. Multiplying with the **P-0-0051, torque constant** of the motor yields the continual operational torque.

With this current, the device is not overloaded. It is also the current to which the current limit reduces.

This parameter is calculated by the drive control during switching to the operating mode and is not changeable. Determining this limit is influenced by the following **current and torque limitations and settings**:

ID-Nr.	Name	Unit
S-0-0111	Motor continuous current at standstill 1)	A
S-0-0112	Amplifier nominal current	A
P-0-4058	Amplifier type data	
S-0-0092	Torque limit bipolar 2)	%

Fig. 3-13: Active continuous current, dependencies

Note: The continuous current at standstill of the motor is that value of which the percentage specifications pocess: it corresponds to 100%.

See also the functional description: "Setting the Active Continuous Current".

P-0-4045 - Attributes

Para. Name:	**DE**	Wirksamer Dauerstrom
	EN	Active permanent current
	FR	Courant permanent actuel
	ES	Corriente continua activa
	IT	Corrente continuativa attiva

Function:	Parameter	**Editability:**	no
Data length:	4Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	no
Unit:	A	**Extrem value check:**	no
Decimal places:	3	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-4046, Active peak current

This parameter shows how much current the drive can supply in the actual combination **momentarily** (0.4 s). Multiplying with the **P-0-0051, torque constant** of the motor yields the momentary operation torque (i.e. for acceleration operations).

This parameter is calculated and preset by the drive control during switching to the operating mode. The dynamic current limiting reduces this value according to the load of the amplifier.

Determining this limit is influenced by the following **current and torque limitations and settings**:

ID-Nr.	Name	Unit
S-0-0109	Motor peak current	A
S-0-0110	Amplifier peak current	A
P-0-4058	Amplifier type data	
S-0-0092	Torque limit bipolar	%

Fig. 3-14: Active peak current, dependencies

See also the functional description: "Setting the active peak current".

P-0-4046 - Attributes

Para. Name:	**DE**	Wirksamer Spitzenstrom		
	EN	Active peak current		
	FR	Courant crête actuel		
	ES	Corriente punta activa		
	IT	Corrente di Picco Attiva		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		A	**Extrem value check:**	no
Decimal places:		3	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-0-4047, Motor inductance

Inductance of the motor, measured between two clamps.

The parameter is set at the factory and cannot be changed.

P-0-4047 - Attributes

Para. Name:	**DE**	Motor-Induktivität		
	EN	Motor inductance		
	FR	Inductance moteur		
	ES	Inductividad de motor		
	IT	Induttanza Motore		
Function:		Parameter	**Editability:**	-
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	-
Unit:		mH	**Extrem value check:**	-
Decimal places:		2	**Combination check:**	no
Input min/max:		0 / 655,36		
Default value:		0	**Cyc. transmittable:**	no

P-0-4050, Delay answer RS-232/485

The **RS-485** interface (bus capable) works in **half duplex** mode. The same pair of wires is used for both directions. The transmission direction must be switched during the data exchange. In oder to allow the connected devices (PC or PLC) a sufficient **time to switch between transmitting and receiving** on their side, the answer time of the drive can be set via this parameter.

P-0-4050 defines the minimal **time in milliseconds** that must pass after the last symbol of a telegram is received over the serial interface and before the first symbol of the response may be sent. For RS-232 operation, this parameter is not necessary.

The required response delay time is dependent on the Master/PC used. At shipping, the value for the answer delay is set to a value which satisfies most **PCs**.

Note: If communication problems arise, for example "TIMEOUT" message in *DriveTop*, then set the answer delay gradually to higher values, until the problems are gone. For safety, multiply the found limit value with the factor 1.5 and input it as answer delay.

See also Supplement A: "Serial communications".

P-0-4050 - Attributes

Para. Name:	**DE**	Antwortverzögerung RS-232/485
	EN	Delay answer RS-232/485
	FR	Délai de réponse RS-232/485
	ES	Retardo de respuesta RS-232/485
	IT	Ritardo su Risposta RS-232/485

Function:	Parameter	**Editability:**	P234
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	P3-4
Unit:	ms	**Extrem value check:**	yes
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-0-4094, C800 Command Base-parameter load

With the execution of this command, all parameters in **S-0-0192, IDN list of backup operation data** are set to their base values.

If the firmware in the prog. module is replaced with another version and the parameter memory is incompatible, then error **F209 PL Load parameter default values** is generated. “**PL**“ appears on the display. (At this time, the ser. interface is not yet active.)

Afterwards, execute the command by pressing the S1 button.

See also the functional description: "Basic parameter block".

P-0-4094 - Attributes

Para. Name:	**DE**	C800 Kommando Basisparameter laden		
	EN	C800 Command Base-parameter load		
	FR	C800 Commande chargement des paramètres de base		
	ES	C800 Comando cargar parámetros base		
	IT	C800 Comando Caricare Parametri di Base		
Function:		Command	**Editability:**	P23
Data length:		2Byte	**Memory:**	-
Format:		BIN	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		--	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-7-0004, Velocity loop smoothing time constant

The time constant that can be activated in this parameter acts on the velocity loop controller.

This is the default value from the feedback data memory. With the Basic Load procedure, the P-7-parameters are copied into the P-0-parameters.

See also the parameter description for P-0-0004.

P-7-0004 - Attributes

Para. Name:	**DE**	Drehzahlregler-Glättungszeitkonstante		
	EN	Velocity loop smoothing time constant		
	FR	Temps de filtrage boucle de vitesse		
	ES	Tiempo de alisamiento n.d.r.		
	IT	Tempo di Smorzamento nell'Anello di Velocità		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	Phase3
Unit:		us	**Extrem value check:**	yes
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-7-0018, Number of pole pairs/pole pair distance

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the number of pole pairs of the motor.

P-7-0018 - Attributes

Para. Name:	**DE**	Polpaarzahl/Polpaarweite
	EN	Number of pole pairs/pole pair distance
	FR	Nombre de paires de pôles/distance polaire
	ES	Numero de par de polo/espacio de par de polo
	IT	Numero di Coppie Poli

Function:	Parameter	**Editability:**	no
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	-
Unit:	pairs of poles/mm	**Extrem value check:**	-
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-7-0051, Torque/force constant

The Torque/Force constant indicates, how much torque or force the motor delivers at a certain real current.

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the torque constant of the motor.

P-7-0051 - Attributes

Para. Name:	**DE**	Drehmoment/Kraft-Konstante		
	EN	Torque/force constant		
	FR	Constante de couple/force		
	ES	Constante de par/fuerza		
	IT	Costante di Coppia/Forza		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		Nm/A	**Extrem value check:**	no
Decimal places:		2	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-7-0508, Commutation offset

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the commutation offset of the motor. The commutation offset contains the angle of the rotor in relation to the motor encoder.

P-7-0508 - Attributes

Para. Name:	**DE**	Kommutierungs-Offset		
	EN	Commutation offset		
	FR	Offset de commutation		
	ES	Offset de conmutación		
	IT	Offset di Commutazione		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:			**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-7-0509, Slot angle

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the slot (keyway) angle of the motor.

P-7-0509 - Attributes

Para. Name:	**DE**	Passfedernut-Winkel		
	EN	Slot angle		
	FR	Angle de clavette		
	ES	Angulo de chavetero		
	IT	Angolo di Inserzione		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_MV	**Validity check:**	no
Unit:			**Extrem value check:**	no
Decimal places:		1	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-7-0510, Moment of inertia of the rotor

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the moment of inertia of the motor's rotor.

P-7-0510 - Attributes

Para. Name:	**DE**	Rotor-Trägheitsmoment		
	EN	Moment of inertia of the rotor		
	FR	Couple d'inertie du rotor		
	ES	Par de inercia de rotor		
	IT	Coppia di Inerzia del Rotore		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		kgm^2	**Extrem value check:**	no
Decimal places:		5	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-7-0511, Brake current

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the brake current of the motor.

P-7-0511 - Attributes

Para. Name:	**DE**	Haltebremsenstrom
	EN	Brake current
	FR	Courant frein
	ES	Corriente de frenado de parada
	IT	Corrente Freno

Function:	Parameter	**Editability:**	no
Data length:	4Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	no
Unit:	A	**Extrem value check:**	yes
Decimal places:	3	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-7-0513, Feedback type 1

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the kind and type of the feedback.

P-7-0513 - Attributes

Para. Name:	**DE**	Feedback-Typ 1
	EN	Feedback type 1
	FR	Type de feedback 1
	ES	Tipo de retroalimentación 1
	IT	Tipo di Feedback 1

Function:	Parameter	**Editability:**	no
Data length:	2Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	no
Unit:	--	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-7-0514, Absolute encoder offset

For motors with feedback data memory, e.g. MKD, this parameter shows the value stored there for the absolute encoder offset. This value is changed by the command **P-0-0012, C300 Command 'Set absolute measurement**.

P-7-0514 - Attributes

Para. Name:	**DE**	Absolutgeber-Offset
	EN	Absolute encoder offset
	FR	Offset du codeur absolu
	ES	Offset de encoder absoluto
	IT	Offset Encoder assoluto

Function:	Parameter	**Editability:**	no
Data length:	4Byte	**Memory:**	-
Format:	DEC_OV	**Validity check:**	no
Unit:	Incr	**Extrem value check:**	no
Decimal places:	0	**Combination check:**	no
Input min/max:	- / -		
Default value:	-	**Cyc. transmittable:**	-

P-7-4028, Impulse wire feedback - offset

The offset of the impulse wires referred to the resolver is saved in this parameter. It is messured in the factory and stored in the feedback memory.

P-7-4028 - Attributes

Para. Name:	**DE**	Impulsdrahtgeber-Offset		
	EN	Impulse wire feedback - offset		
	FR	Offset codeur impulsionnel câblé		
	ES	Offset de encoder de cable de impulsos		
	IT	Offset Impulso di Zero		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-7-4029, Impulse wire feedback - PIC counter value

This parameter contains the information of the absolute position of the encoder.

The value is updated at every position initialization. The value is read-only and cannot be edited by the user.

P-7-4029 - Attributes

Para. Name:	**DE**	Impulsdrahtgeber-Zählerstand		
	EN	Impulse wire feedback - PIC counter value		
	FR	Valeur du compteur codeur impulsionnel câblé		
	ES	Nivel de contador encoder de cable de impulsos		
	IT	Contatore Impulsi di Zero		
Function:		Parameter	**Editability:**	no
Data length:		4Byte	**Memory:**	-
Format:		HEX	**Validity check:**	no
Unit:		--	**Extrem value check:**	no
Decimal places:		0	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

P-7-4047, Motor inductance

Inductance of the motor, measured between two clamps.

This is the value from the feedback data memory. During Basic Load, the P-7 parameters are copied into the P-0 parameters.

The parameter is set at the factory and cannot be changed.

P-7-4047 - Attributes

Para. Name:	**DE**	Motor-Induktivität		
	EN	Motor inductance		
	FR	Inductance moteur		
	ES	Inductividad de motor		
	IT	Induttanza Motore		
Function:		Parameter	**Editability:**	no
Data length:		2Byte	**Memory:**	-
Format:		DEC_OV	**Validity check:**	no
Unit:		mH	**Extrem value check:**	no
Decimal places:		2	**Combination check:**	no
Input min/max:		- / -		
Default value:		-	**Cyc. transmittable:**	-

1.

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Notizen

DIAX04
Drive With Main Spindle Function,
Analog- and Parallelinterface

Supplement B
Diagnostic Message Description
AHS 03VRS

DOK-DIAX04-AHS-03VRS**-FK01-EN-P

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Notes

1 Diagnostic Message Descriptions

1.1 Overview of the diagnostic message descriptions

Diagnostic Message Types

Each operational state of the drive will be characterized with a diagnostic message.

Differentiations will be made between:

- **Error diagnostic messages**
- **Warning diagnostic messages**
- **Command diagnostic messages**
- **Drive Mode diagnostic messages**
- **Operation status**

Construction of a diagnostic message

A diagnostic message consists of:

- **A diagnostic number** and a
- **diagnostic text**

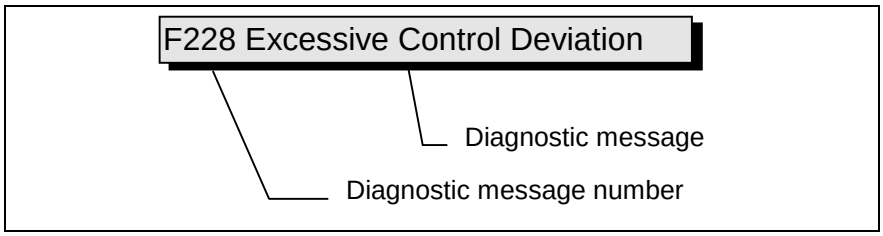

Fig. 1-1: Diagnostic message with a diagnostic number and text.

For the example in the graphic, "F2" and "28" are shown alternately on the H1-Display.

The control system can read out the diagnostic number in hexadecimal form with the **S-0-0390, Diagnostic message number** parameter.

In addition, the drive allocates to the control system the diagnostic number and diagnostic text as a string **F228 Excessive deviation** with the **S-0-0095, Diagnostic message** parameter.

Display

The H1-Display serves as an optical display of the diagnostic message on the drive and for two-axis devices (HDD) additionally the H2-Display.

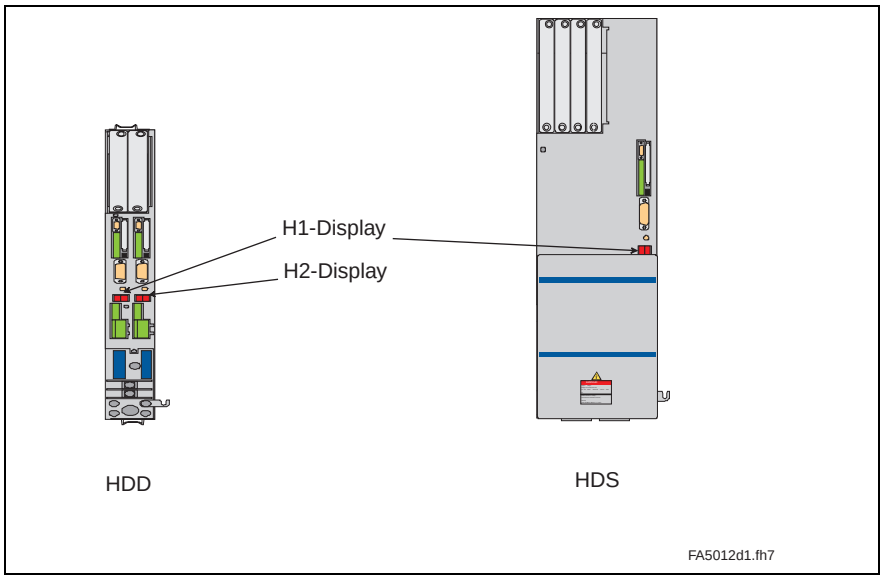

Fig. 1-2: H1-/H2-Display on HDS- and HDD-Drive

The diagnostic number appears on this two-positional seven-segment display. The image can be seen on the "Diagnostic Message Priority Display".

This display quickly shows the current operation status without the use of a communications interface.

The operating mode cannot be seen from the H1- ... H2 Display. If the drive follows the operating mode and no command was activated, then the symbol "AF" appears on the display.

Diagnostic Message Output Priority

If more than one diagnostic message is waiting, then the message with the highest priority will be displayed.

The following graphic classifies operation status in order of importance.

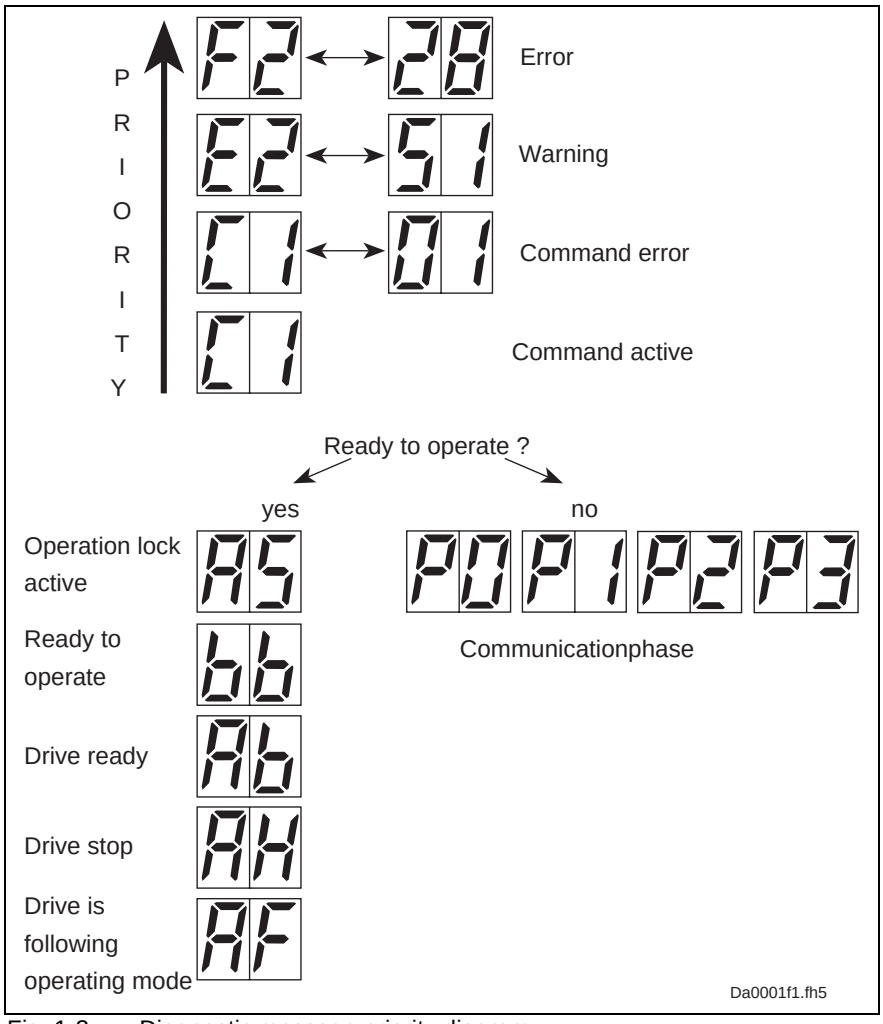

Fig. 1-3: Diagnostic message priority diagram

Clear Coded Diagnostic Message

The clear coded diagnostic message contains the diagnostic number followed by the diagnostic text, as shown in the example, "Excessive Output Error" (Fig. 1-1). It can be read out with the **S-0-0095, Diagnostic message** parameter and directly displays the operation status on an operator surface.

The clear coded diagnostic message will be switched to the current language.

Notes

1.2 Error Diagnostic Messages

F208 UL The motor type has changed.

This indication happens when you power up for the first time with a new motor.

The regulator settings for the current, velocity and position loops are stored in the feedback on the motor. After powering up, the drive compares the motor type stored in the parameter with the connected motor type. If the two do not match, basic control loop settings must be adapted, too.

With the Basic Load command, the default control loop settings are loaded from the feedback memory into the drive. The previous loop settings are overwritten. By pressing the S1 key, the command Basic Load is started.

Causes:

- The motor has been exchanged.
- A parameter file has been loaded, but the parameter **S-0-0141, Motor type** contained a motor type different from the present one.

Remedy:

Command **C700 Basic Load** or press the S1 button.

See also the functional description: "Automatic execution of the load default feature".

F208 - Attributes

H1 Display :		UL
Diag. mess.:	**DE**	F208 UL Der Motortyp hat sich geändert.
	EN	F208 UL The motor type has changed.
	FR	F208 UL Le type de moteur a changé.
	ES	F208 UL El tipo de motor ha cambiado.
	IT	F208 UL Cambiato Tipo di Motore
Mess. no.:		F208 (hex)
Error no:		208
Class:		Not fatal

F209 PL Load parameter default values

After replacing the firmware version, the drive displays “**PL**”, if the parameters have been changed in regards to the old product. By pressing the S1 button on the drive controller or by starting the command “load basic parameters”, all the parameters will be erased and restored with the default (initial) values.

Cause:

The firmware has been exchanged; the number of parameters in comparison to the old product has changed.

Remedy:

Press S1 button on the drive controller, and all the parameters will be erased and restored with the factory preset default values

WARNING

⇒ This overwrites all parameters and positioning blocks.

See also the functional description: "Basic parameter block".

F209 - Attributes

H1 Display :		PL
Diag. mess.:	**DE**	F209 PL Defaultwerte der Parameter laden
	EN	F209 PL Load parameter default values
	FR	F209 PL Charger les valeurs init. des paramètres
	ES	F209 PL Cargar valores init.
	IT	F209 PL Caricare le Valori init. dei Parametri
Mess. no.:		F209 (hex)
Error no:		209
Class:		Not fatal

F218 Amplifier overtemp. shutdown

The temperature of the amplifier's heatsink is monitored. If the heatsink is too hot, the drive will power down in order to protect against damage.

Cause:

1. Ambient temperature too high. The specified performance data are valid up to an ambient temperature of 45°C.
2. The amplifier's heatsink is dirty.
3. Air flow is prevented by other assembly parts or the control cabinet assembly.
4. Blower defective

Remedy:

For 1. Reduce the ambient temperature, e.g. through cooling of the control cabinet.

For 2. Remove obstructions or dirt from the heatsink.

For 3. Install the device vertically and clear a large enough area for proper heatsink ventilation.

For 4. Exchange drive.

F218 - Attributes

H1 Display :		F2/18
Diag. mess.:	**DE**	F218 Verstärker-Übertemp.-Abschaltung
	EN	F218 Amplifier overtemp. shutdown
	FR	F218 Surchauffe ampli
	ES	F218 Desconexión por exceso de temperatura de amplificador
	IT	F218 Spegnimento per Sovratemp. Dissapatore
Mess. no.:		F218 (hex)
Error no:		218
Class:		Not fatal

F219 Motor overtemp. shutdown

If the motor temperature exceeds the value in **S-0-0204, Motor shutdown temperature**, the drive will generate this error message. The value in **S-0-0204** is fixed at 150°C for MDD-,MKD- and MKE motors. The appropriate value must be entered from the motor's technical specifications for all other types of motors.

For motors of series: 2AD, 1MB, LAF, LAR, and MBW, the current motor temperature can be called up with parameter **S-0-0383, Motor temperature**.

Cause:

1. The motor became overloaded. The effective torque demand on the motor was above its permissible continuous torque level for too long.
2. Short circuit or ground in the connection to motor temperature monitoring.
3. Instability in the velocity control loop.

Remedy:

For 1. Check the layout of the motor. For motors which have been in operation for longer periods of time, check to see if the operating conditions have changed (in regards to cleanliness, friction, moved components, etc.).

For 2. Check the wiring to the motor temperature monitor X6/1 and X6/2 for grounds and short circuits.

For 3. Check the velocity control loop parameters (see the functional description).

See also the functional description: "Temperature monitoring"

F219 - Attributes

H1 Display :		F2/19
Diag. mess.:	**DE**	F219 Motor-Übertemp.-Abschaltung
	EN	F219 Motor overtemp. shutdown
	FR	F219 Surchauffe moteur
	ES	F219 Desconexión por exceso de temperatura de motor
	IT	F219 Spegnimento per Sovratemp. Motore
Mess. no.:		F219 (hex)
Error no:		219
Class:		Not fatal

F221 Motor temp. surveillance defective

Cause:

Wire break or interruption in the wires for the motor temperature monitoring.

Remedy:

Check the wiring for the motor temperature monitoring (signals MT(emp)+ and MT(emp)-) for interruption and short circuit.

See also the functional description: "Temperature monitoring".

F221 - Attributes

H1 Display : F2/21

Diag. mess.:
DE F221 Motor-Temp.überwachung defekt
EN F221 Motor temp. surveillance defective
FR F221 Erreur dans la surveillance température moteur
ES F221 Control de temperatura de motor defectuoso
IT F221 Errore nel Controllo della Temperatura Motore

Mess. no.: F221 (hex)

Error no: 221

Class: Not fatal

F226 Undervoltage in power section

The level of the DC bus voltage is monitored by the drive controller. If the DC bus voltage falls below a minimal threshold, the drive independently shuts down according to the set error reaction.

Cause:

1. The power source has been interrupted without first switching off the drive enable (RF).
2. Disturbance in the power supply

Remedy:

For 1. Check the logic regarding the activation of the drive within the connected control.

For 2. Check the power supply.

The error can be cleared by removing the drive enable signal.

See also the functional description: "drive enable"

F226 - Attributes

H1 Display : F2/26

Diag. mess.:
DE F226 Unterspannung im Leistungsteil
EN F226 Undervoltage in power section
FR F226 Sous-tension puissance
ES F226 Tensión baja en parte de potencia
IT F226 Errore Alimentazione bassa nello Stadio di Potenza

Mess. no.: F226 (hex)

Error no: 226

Class: Not fatal

F228 Excessive deviation

When the position loop is closed, the drive monitors whether it is able to follow the specified command value. This is done by calculating a model position value in the drive and comparing that value with the actual feedback value. If the difference between theoretical and actual position value permanently exceeds the value of the **S-0-0159, Monitoring window** parameter, the drive oviously cannot follow the given command value. Then this error is generated.

Cause:

1. The drive's **acceleration** capacity has been exceeded.
2. The axis is **blocked**.
3. Incorrect parameter values set in the drive parameters.
4. Incorrect parameter values in **S-0-0159, Monitoring window**.

Remedy:

Ref. 1. Check the **S-0-0092, Bipolar torque/force limit value** parameter and set it to the maximum permissible value of the application. Reduce the specified acceleration value from the controller (see controller Manual).

Ref. 2. Check the mechanical system and eliminate jamming of the axis.

Ref. 3. Check the drive parameters (control loop tuning).

Ref. 4. Set the parameter values of **S-0-0159, Monitoring window**.

See also the functional description "Position control loop monitoring".

F228 - Attributes

H1 Display :		F2/28
Diag. mess.:	**DE**	F228 Exzessive Regelabweichung
	EN	F228 Excessive deviation
	FR	F228 Déviation de posit. excessive
	ES	F228 Desviación de regulación excesiva
	IT	F228 Deviazione eccessiva
Mess. no.:		F228 (hex)
Error no:		228
Class:		Not fatal

F229 Encoder 1 failure: quadrant error

With wrong signals in the encoder evaluation, a hardware error has been discovered in the encoder interface 1 being used.

Cause:

1. Defective encoder cable
2. Disruptive electro-magnetic interference on the encoder cable
3. Defective encoder interface
4. Defective drive controller

Remedy:

For 1. Exchange the encoder cable.

For 2. Keep the encoder cable well away from the power cables.

For 3. Exchange the encoder interface.

For 4. Exchange the drive controller.

F229 - Attributes

H1 Display : F2/29

Diag. mess.:
DE F229 Fehler Geber 1: Quadrantenfehler
EN F229 Encoder 1 failure: quadrant error
FR F229 Erreur codeur 1: erreur de quadrant
ES F229 Error de encoder 1: error de cuadrante
IT F229 Errore Encoder 1: Errore Quadrante

Mess. no.: F229 (hex)

Error no: 229

Class: Not fatal

F233 External power supply error

Cause:

The DEA plug-in modules have isolated inputs and outputs. Proper operation of those inputs and outputs requires an external 24-V voltage to be applied. The drive monitors that voltage as soon as a DEA plug-in module has been installed.

Remedy:

Check the external 24-V power supply.

Name:	Unit:	min.:	typ.:	max.:
External operating voltage $+U_L$	V	18	24	32
External current consumption I_L	mA			100

Fig. 0-1: External power supply

See also the functional description: "Digital I/O Functional Principle"

F233 - Attributes

H1 Display : F2/33

Diag. mess.:
DE F233 Fehler Spannungsversorgung extern
EN F233 External power supply error
FR F233 Erreur dans l'alimentation externe
ES F233 Error de suministro de potencia externa
IT F233 Errore Alimentatore esterno

Mess. no.: F233 (hex)

Error no: 233

Class: Not fatal

F234 Emergency-Stop

Cause:

The emergency stop function was activated by turning off the +24V current at the E-Stop input. The drive was brought to a standstill by the previously set error response.

Remedy:

1. Eliminate the condition which caused the +24V current at the E-Stop input to be turned off.
2. Do the "Reset class 1 diagnostic" command, e.g. with the control system or the S1 button on the drive controller.

See also the functional description: "Emergency stop feature."

F234 - Attributes

H1 Display : F2/34

Diag. mess.:
DE F234 E-Stop aktiviert
EN F234 Emergency-Stop
FR F234 Arrêt d'urgence
ES F234 Parada de emergencia activada
IT F234 Stop per Emergenza

Mess. no.: F234 (hex)

Error no: 234

Class: Not fatal

F236 Excessive position feedback difference

Cause:

In the communication phase 4 transition check command, position feedback value 1 and position feedback value 2 are set to the same value, and the cyclic evaluation of both encoders is started. In cyclic operation (phase 4), the position feedback difference of both encoders is compared with **S-0-0391, Monitoring window feedback 2**. If the amount of the difference exceeds the monitoring window, the error F236 Excessive position feedback difference is diagnosed, the parameter-selected error response is performed, and the reference bits of both encoders are cleared.

Notes: The monitoring is off, when the parameter S-0-0391, Monitoring window feedback 2 is set to the value 0.

Possible Causes :

1. Incorrect parameter for the encoder 2
   (**S-0-0115, Position feedback 2 type parameter,**
   S-0-0117, Resolution of feedback 2)
2. Incorrect parameter setting of mechanical system between motor shaft and encoder 2:
   (S-0-0121, Input revolutions of load gear,
   S-0-0122, Output revolutions of load gear,
   S-0-0123, Feed constant)
3. The mechanical system between motor shaft and encoder 2 is not rigid (e.g. gear play).
4. Defective encoder cable
5. Maximum input frequency of the encoder interface exceeded
6. Encoder 2 (optional) is not mounted to the driven axis.
7. Incorrect reference measure of an absolute encoder

Remedy:

Ref. 1. Check **S-0-0115, Position feedback 2 type parameter** and **S-0-0117, Resolution of feedback 2**.

Ref. 2. Check **S-0-0121, S-0-0122, Input/Output revolutions of load gear** and **S-0-0123, Feed constant**.

Ref. 3. Increase **S-0-0391, Monitoring window feedback 2**.

Ref. 4. Replace encoder cable.

Ref. 5. Reduce the velocity.

Ref. 6. Set **S-0-0391, Monitoring window feedback 2** to 0 (de-activate monitoring function).

Ref. 7. Perform **P-0-0012, C300 Command 'Set absolute measurement'**.

See also the functional description "Actual feedback value monitoring".

F236 - Attributes

H1 Display : F2/36

Diag. mess.:
DE F236 Exzessive Lageistwertdifferenz
EN F236 Excessive position feedback difference
FR F236 Différence excessive en position réelle
ES F236 Diferencia excesiva de valor real de posición
IT F236 Eccessiva diff. nel Feedback di Posizione

Mess. no.: F236 (hex)

Error no: 236

Class: Not fatal

F237 Excessive position command difference

Cause:

When the drive is operating in position control, incoming position command values are monitored. If the velocity required of the drive by two successive position command values is greater than or equal to the value in **S-0-0091, Bipolar velocity limit value**, position command value monitoring is initiated. The **Excessive position command value** is stored in parameter **P-0-0010**. The **last valid position command value** is stored in parameter **P-0-0011**.

If position data are to be processed in modulo format, then the interpretation of the command is also dependent on the value set in **S-0-0393, Command value mode for modulo format.** The parameter should be set for the "shortest path" (0).

Remedy:

Compare S-0-0091, Bipolar velocity limit value with the velocity in the program and adjust to match it, if necessary.

F237 - Attributes

H1 Display : F2/37

Diag. mess.:
DE F237 Exzessive Lagesollwertdifferenz
EN F237 Excessive position command difference
FR F237 Différence excessive en position consigne
ES F237 Diferencia excesiva de valor nominal de posición
IT F237 Eccessiva diff. nella Posizione comandata

Mess. no.: F237 (hex)

Error no: 237

Class: Not fatal

F242 Encoder 2 failure: signal too small

Cause:

The analog signals of an external measurement system are used for high resolution analysis of that measurement system. These are monitored according to two criteria:

1. The pointer length, which is calculated from the sine and cosine signals, must be at least 1 V.
2. The maximum pointer length resulting from the sine and cosine signals must not exceed 11.8 V.

$$\text{pointerlength} = \sqrt{\sin^2 + \cos^2}$$

Fig. 0-1: Pointer length

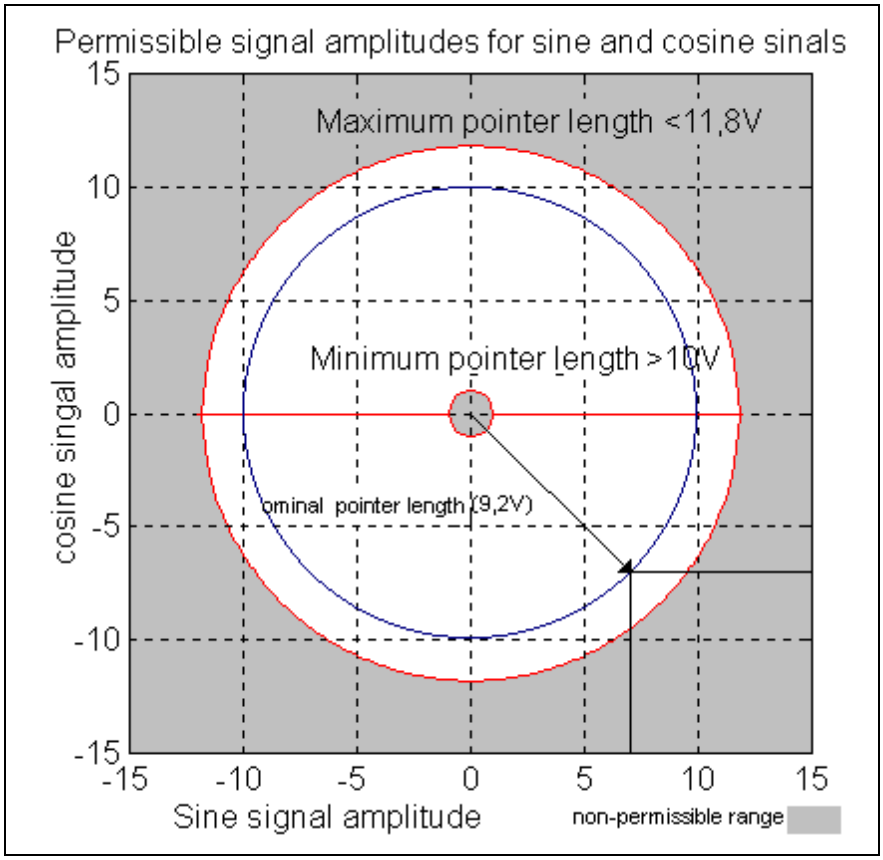

Fig. 0-2: Correct signal amplitude

Example:

Ucos = -6.5V

Usin = 6.5V

$$\text{pointerlength} = \sqrt{(-6.5\text{V})^2 + 6.5\text{V}^2} \approx 9.2\text{V}$$

Remedy:

1. Check the measurement system cable.
2. Check the measurement system.

F242 - Attributes

H1 Display : F2/42

Diag. mess.:
DE F242 Fehler Geber 2: Signalamplitude fehlerhaft
EN F242 Encoder 2 failure: signal too small
FR F242 Erreur codeur 2: signal trop faible
ES F242 Error encoder 2: señal pequeña
IT F242 Errore Encoder 2: Ampiezza troppo bassa

Mess. no.: F242 (hex)

Error no: 242

Class: Not fatal

F245 Encoder 2 failure: quadrant error

The evaluation of the additional optional encoder (encoder 2) is active. In the evaluation of the sinusoidal input signals of the optional encoder, a plausibility check is performed between these signals and the counter fed by these signals. Doing this, an error has been encountered.

Cause:

1. Defective encoder cable
2. Disruptive electro-magnetic interference on the encoder cable
3. Defective encoder interface

Remedy:

For 1. Exchange the encoder cable.

For 2. Keep the encoder cable well away from power cables.

For 3. Exchange the encoder interface (DIAX) or the device (Ecodrive).

F245 - Attributes

H1 Display : F2/45

Diag. mess.:
DE F245 Fehler Geber 2: Quadrantenfehler
EN F245 Encoder 2 failure: quadrant error
FR F245 Erreur codeur 2: erreur de quadrant
ES F245 Error encoder 2: error de cuadrante
IT F245 Errore Encoder 2: Errore di Quadrante

Mess. no.: F245 (hex)

Error no: 245

Class: Not fatal

F248 Low battery voltage

Cause:

For motors of series MKD and MKE, the absolute position information is stored by a battery-powered electronic in the motor feedback. The battery is designed for a 10-year life span. If the battery voltage falls below 2.8 V, this message appears. The absolute encoder function will still be preserved for about 2 weeks.

CAUTION

Malfunction in the control of motors and moving elements
Possible damages: Mechanical injuries

⇒ Replace the battery as soon as possible.

Instructions for Exchanging Batteries

Have the following tools and accessories ready:

- Torx screwdriver size 10
- Needle-nose pliers, torque wrench
- New packaged battery (Part No. 257101)

CAUTION

Malfunction in the control of motors and moving elements

Possible damages: Mechanical injuries

⇒ Turn off the power supply. Make sure it will not be turned back on. Exchange the battery while the control voltage (24V) is turned on.

If the control voltage is turned off while the battery is taken out, the absolute **reference** point will be lost. Then, the reference point must be reestablished with the command "**Set absolute measuring**".

Removing the Battery

- Unscrew torx screws with size 10 screwdriver.
- Pull out the resolver feedback (RSF) lid by hand.
- Pull off the battery connector.
- Loosen battery clamp and remove the battery.
- Place the prepared battery in the housing and screw on the clamp. **Attention!** Do not kink or clamp the battery cable.
- Attach the connector of the battery.

Close the resolver feedback lid, screw in 4 torx screws and tighten to 1.8 Nm with the torque wrench.

F248 - Attributes

H1 Display :		F2/48
Diag. mess.:	**DE**	F248 Batterie-Unterspannung
	EN	F248 Low battery voltage
	FR	F248 Sous-tension batterie
	ES	F248 Batería baja
	IT	F248 Tensione Batteria bassa
Mess. no.:		F248 (hex)
Error no:		248
Class:		Not fatal

F253 Incr. encoder emulator: pulse frequency too high

Cause:

The incremental encoder emulator can process a maximum of 1023 lines per sample period (250µs); this value has been exceeded.

Remedial action:

1. Reduce the **number of lines** of the incremental encoder emulator (P-0-0502).

or

2. Reduce the travel **velocity**.

See also the functional description: "Encoder Emulation".

F253 - Attributes

H1 Display : F2/53

Diag. mess.:
DE F253 Inkrementalgeberemulator: Frequenz zu hoch
EN F253 Incr. encoder emulator: pulse frequency too high
FR F253 Erreur émulation de codeur incr.: fréquence trop haute
ES F253 Emulador encoder incr.: frecuencia demasiado alta
IT F253 Encoder incrementale: Frequenza troppo alta

Mess. no.: F253 (hex)

Error no: 253

Class: Not fatal

F254 Incr. encoder emulator: hardware fault

Before the next increment output is started, the system checks at the end of each scan interval (250 µs) whether all increments have been output. this error is generated if the outputs overlap.

Cause:

- Internal run time exceeded
- Hardware error

Recovery:

Switch all functions off (e.g., analog outputs, etc.) that are not needed. If this does not clear the error, note the number of lines (use P-0-0502) and traversing speed at which error occurred and call Indramat customer service.

See function description: "Activating Encoder Emulation".

F254 - Attributes

H1 Display : F2/54

Diag. mess.:
DE F254 Inkrementalgeberemulator: Hardware-Fehler
EN F254 Incr. encoder emulator: hardware fault
FR F254 Erreur émulation de codeur incr.: hardware cassé
ES F254 Emulador encoder incr.: hardware defectuoso
IT F254 Encoder incrementale: Guasto nel Hardware

Mess. no.: F254 (hex)

Error no: 254

Class: Not fatal

F255 External power supply DAE 02 error

The analog interface DAE 02.1 requires an external 24-V power supply that must be connected to terminal X75, pin 8 (+24 V) and pin 9 (0 V). This error message is issued if the external power supply is missing or outside the range 18...32 V. This function also detects transient faults, caused by spikes, etc.

Remedial action:

1. Provide power to the interface from a regulated power supply unit.
2. Use different power supply units or motor brake and interface; in particular if long motor cables are used.

F255 - Attributes

H1 Display : F2/55

Diag. mess.:
DE F255 Fehler externe Spannungsversorgung DAE 02
EN F255 External power supply DAE 02 error
FR F255 Erreur alimentation externe DAE 02
ES F255 Error Suministro de potencia externa DAE 02
IT F255 Guasto nell'Alimentazione esterna DAE 02

Mess. no.: F255 (hex)

Error no: 255

Class: Not fatal

F267 Erroneous internal hardware synchronization

Cause:

The drive control is synchronized on the bus interface (SERCOS, Profibus, Interbus, ...). The correct fuction of the synchronization is monitored. If the average value of the deviation exceeds 5 µs, this error is generated.

Remedy:

Replace drive controller.

F267 - Attributes

H1 Display : F2/67

Diag. mess.:
DE F267 Hardware-Synchronisation fehlerhaft
EN F267 Erroneous internal hardware synchronization
FR F267 Faute de synchronisation du matériel interne
ES F267 Sincronización de hardware interno defectuosa
IT F267 Sincronizz. Hardware interna errata

Mess. no.: F267 (hex)

Error no: 267

Class: Not fatal

F268 Brake fault

The drive controller takes control of the brake for motors with an integrated holding brake. The braking current is monitored.
If the braking current is outside of the permissible range between:

0.4 -1.6 * **P-0-0511, Break current**

this error message will be generated.

Cause:

1. The power supply for the brake is not connected properly or is outside of the (24 V +/- 10%) tolerance.
2. The motor cable is incorrectly connected (wiring error).
3. Defective brake.
4. Defective drive controller.

Note: A metallic connector between the 0V brake supply and the 0V of the drive controller is required.

Remedy:

For 1. Check the power supply.

For 2. Check the motor cable.

For 3. Exchange the motor.

For 4. Exchange the drive controller.

See also the functional description: "Setting the motor brake current"

F268 - Attributes

H1 Display :		F2/68
Diag. mess.:	**DE**	F268 Fehler Bremse
	EN	F268 Brake fault
	FR	F268 Erreur du frein
	ES	F268 Fallo freno
	IT	F268 Errore Freno
Mess. no.:		F268 (hex)
Error no:		268
Class:		Not fatal

F276 Absolute encoder out of allowed window

When turning off the drive controller with an absolute encoder (multiturn), the actual feedback position will be stored. When powered up, the absolute position given by the encoder is compared with the stored position.

Notes: If the deviation is greater than the paramaterized **P-0-0097, Absolute Encoder Monitoring Window**, the error **F276** will appear and be given to the control system.

Cause:

1. Turning on for the first time (invalid stored position)
2. The motor has been moved further than allowed by the parameter in the absolute encoder monitoring window, P-0-0097, while it was turned off.
3. Incorrect position initialization

Remedy:

For 1. Press S1 to reset the error and set the absolute position.

For 2. The motor was moved while turned off and sits outside of its permissible position. Check to see if the displayed position is correct in relation to the machine zero point. Reset subsequent errors.

For 3. **An accident may occur by accidental shaft movement.** Check absolute position information. The feedback is defective if the absolute position information is wrong. The motor should be exchanged and sent to the INDRAMAT Customer Service.

See also Function Description "Absolute Encoder Monitoring".

F276 - Attributes

H1 Display : F2/76

Diag. mess.:
DE F276 Absolutgeber außerhalb des Überwachungsfensters
EN F276 Absolute encoder out of allowed window
FR F276 Codeur absolu hors du fenêtre de surveillance
ES F276 Encoder absoluto fuera de la ventana de control
IT F276 Encoder Assoluto fuori Finestra

Mess. no.: F276 (hex)

Error no: 276

Class: Not fatal

F277 Current measurement trim wrong

The current reading in the drive controller is compensated for during operation. The compensation values are stored in parameters P-0-4000 and P-0-4001. These values are queried to ensure they maintain the tolerance of +/- 10 %. Should the values be greater, then the error is generated.

Cause:

1. Hardware defective in the drive controller.

Recovery:

1. Replace hardware.

F277 - Attributes

H1 Display : F2/77

Diag. mess.:
DE F277 Strommessabgleich fehlerhaft
EN F277 Current measurement trim wrong
FR F277 Justage de la mesure du courant faux
ES F277 Compensación de medición de corriente defectuosa
IT F277 Errore nella Misura di Corrente offset

Mess. no.: F277 (hex)

Error no: 277

Class: Not fatal

F316 Softstart fault power supply unit

The DC bus cannot be loaded.

Cause:

1. Short-circuit in power supply or drive controller.
2. Too many additional capacitors have been connected.
3. Interrupt in DC bus choke (only applies to HVE)

Remedy:

1. Release connection to drive controllers and turn power back on. If unit is defective, replace it.
2. Number of additional capacitor must be reduced or a separate loading device must be used.
3. DC bus choke and lines must be checked, possibly replaced.

F316 - Attributes

H1 Display :		F3/16
Diag. mess.:	**DE**	F316 Softstartfehler Versorgungsmodul
	EN	F316 Softstart fault power supply unit
	FR	F316 Erreur su soft-start dans l'alimentation
	ES	F316 Error inicio de soft módulo de alimentación
	IT	F316 Guasto nel Softstart del Alimentatore
Mess. no.:		F316 (hex)
Error no:		316
Class:		Not fatal

F318 Heatsink overtemp. fault power supply unit

Power switched off due to excessive heatsink temperature.

Cause:

The unit is overloaded over ambient temperature is too high.

Remedy:

Check load and ambient temperature. Temperature pre-warning contact of the unit must be checked.

F318 - Attributes

H1 Display :		F3/18
Diag. mess.:	**DE**	F318 Kühlkörper-Übertemp. Versorgungsmodul
	EN	F318 Heatsink overtemp. fault power supply unit
	FR	F318 Surchauffe module d'alimentation
	ES	F318 Sobretemperatura
	IT	F318 Sovratemp. nel Alimentatore
Mess. no.:		F318 (hex)
Error no:		318
Class:		Not fatal

F320 Bleeder overload

Power off due to high bleeder load.

Cause:

1. In the HVR, too much regenerated drive energy even with power off.
2. In the HVE, continuous regenerated power or rotary drive energy is too high.
3. Unit is defective.

Remedy:

On 1: Reduce drive speed. Delay power off in the case of OFF or and emergency stop.

On 2: Increase cycle time, reduce the speed of the drive, install additional bleeder.

On 3: Replace unit.

F320 - Attributes

H1 Display : F3/20

Diag. mess.:
DE F320 Bleeder-Überlast
EN F320 Bleeder overload
FR F320 Surcharge bleeder
ES F320 Sobrecarga Bleeder
IT F320 Sovracarico Bleeder

Mess. no.: F320 (hex)

Error no: 320

Class: Not fatal

F360 Overcurrent power supply unit

With HVR only!

Cause:

Short-circuit in power supply unit, drive controller, motor or a cable.

Remedy:

Disconnect power supply lines on the drive controller one at a time. Replace a unit if it is defective.

F360 - Attributes

H1 Display : F3/60

Diag. mess.:
DE F360 Überstrom Versorgungsmodul
EN F360 Overcurrent power supply unit
FR F360 Courant excessif dans l'alim. puissance
ES F360 Corriente excesiva en módulo de alimentación
IT F360 Sovracorrente nel Alimentatore

Mess. no.: F360 (hex)

Error no: 360

Class: Not fatal

F369 +24V/+-15V/+5V fault power supply unit

Control voltage interference.

Cause:

1. Maximum permissible load has been exceeded
2. Short-circuit in wiring if control voltage is used outside of drive system.
3. Unit is defective.

Recovery

On 1: Release bus connections to drive controller one after the other.

On 2: Release control voltage taps and check for short-circuits.

On 3: Replace unit.

F369 - Attributes

H1 Display : F3/69

Diag. mess.:
DE F369 +24V/+-15V/+5V Fehler Versorgungsmodul
EN F369 +24V/+-15V/+5V fault power supply unit
FR F369 Erreur +24V/+-15V/+5V dans l'alim. puissance
ES F369 Fallo +24V/+-15V/+5V en alimentación de potencia
IT F369 Guasto +24V/+-15V/+5V nel Alimentatore

Mess. no.: F369 (hex)

Error no: 369

Class: Not fatal

F380 Short to ground power supply unit

Cause:

Ground short: in power supply unit
in drive controller
in motor or motor cable

Remedy:

Release connections to motor and power supply unit one at a time. Replace defective drive components.

F380 - Attributes

H1 Display : F3/80

Diag. mess.:
DE F380 Erdschluss Versorgungsmodul
EN F380 Short to ground power supply unit
FR F380 Court circuit à terre de l'alim. puissance
ES F380 Cortocircuito a tierra de la alimentación de potencia
IT F380 Corto verso Terra del Alimentatore

Mess. no.: F380 (hex)

Error no: 380

Class: Not fatal

F381 Mains failure

With HVR only !

Cause:

At least one phase of the power supply is missing.

Remedy:

Check mains fuses and replace, if necessary.

F381 - Attributes

H1 Display : F3/81

Diag. mess.:
DE F381 Netzausfall
EN F381 Mains failure
FR F381 Alimentation de puissance manque
ES F381 Fallo en la red
IT F381 Guasto Alimentazione Potenza

Mess. no.: F381 (hex)

Error no: 381

Class: Not fatal

F382 Mains phase loss fault

With HVE only !

Cause:

At least one phase of the power supply is missing.

Remedy:

Check mains fuses and replace, if necessary.

F382 - Attributes

H1 Display :		F3/82
Diag. mess.:	**DE**	F382 Netz-Phasen-Fehler
	EN	F382 Mains phase loss fault
	FR	F382 Perte de phase à l'entrée puissance
	ES	F382 Fallo en fase de red
	IT	F382 Guasto di Fase dell'Alimentazione Potenza
Mess. no.:		F382 (hex)
Error no:		382
Class:		Not fatal

F383 Line voltage fault

With HVR only !

Cause:

Mains voltage exceeds permissible tolerance (3x 380 ... 480V, ± 10 %).

Remedy:

Check mains voltage, use matching transformer, if necessary.

F383 - Attributes

H1 Display :		F3/83
Diag. mess.:	**DE**	F383 Netzspannungsfehler
	EN	F383 Line voltage fault
	FR	F383 Tension à l'entrée de puissance fausse
	ES	F383 Tensión incorrecta en entrada de tensión
	IT	F383 Tensione falsa dell'Alimentazione Potenza
Mess. no.:		F383 (hex)
Error no:		383
Class:		Not fatal

F384 Connection error at power supply unit

With HVR only !

Cause:

Power and control voltage connects are not phase coincident.

Remedy:

Check connection voltage. Terminals X5/U and X8/1, X5/V and X8/2, X5/W and X8/3 may not conduct voltage to each other.

F384 - Attributes

H1 Display : F3/84

Diag. mess.:
DE F384 Anschlussfehler am Versorgungsmodul
EN F384 Connection error at power supply unit
FR F384 Alimentation de puissance faussement branchée
ES F384 Error de conexión en módulo de alimentación
IT F384 Connezione falsa al Alimentatore

Mess. no.: F384 (hex)

Error no: 384

Class: Not fatal

F385 Line frequency fault

With HVR only !

Cause:

Mains frequency exceeds permissible tolerance (± 2Hz).

F385 - Attributes

H1 Display : F3/85

Diag. mess.:
DE F385 Netzfrequenzfehler
EN F385 Line frequency fault
FR F385 Fréquence de l'alim. puissance fausse
ES F385 Error en frecuencia de red
IT F385 Frequenza de l'Alim. Potenza falsa

Mess. no.: F385 (hex)

Error no: 385

Class: Not fatal

F394 Checksum error power supply unit

With HVR only !

Cause:

Unit failure.

Remedy:

Replace unit.

F394 - Attributes

H1 Display : F3/94

Diag. mess.:
DE F394 Checksummenfehler Versorgungsmodul
EN F394 Checksum error power supply unit
FR F394 Checksum faux dans l'alim. puissance
ES F394 Error suma de verificación en alimentación de potencia
IT F394 Checksum falsa nel Alimentatore

Mess. no.: F394 (hex)

Error no: 394

Class: Not fatal

F434 Emergency-Stop

Pressing the emergency stop switch (E-Stop) has caused the drive to perform the emergency stop function that was selected in the **P-0-0119, Best possible deceleration** parameter. Setting bit 15 of **S-0-0011, Class 1 diagnostics** causes an error message to be issued to the controller.

Cause:

The emergency stop switch has been pressed.

Remedy:

Eliminate the malfunction that has caused the emergency switch to be actuated, and clear the error.

See also the functional description: "Emergency stop feature".

F434 - Attributes

H1 Display :		F4/34
Diag. mess.:	**DE**	F434 E-Stop aktiviert
	EN	F434 Emergency-Stop
	FR	F434 Arrêt d'urgence
	ES	F434 Parada de emergencia activada
	IT	F434 Stop per Emergenza
Mess. no.:		F434 (hex)
Error no:		434
Class:		Interface

F634 Emergency-Stop

Pressing the emergency stop (E-Stop) switch has caused the drive to stop by setting the velocity command value to zero. An error is reported in the **S-0-0011, Class 1 diagnostics** parameter.

Cause:

The emergency stop switch has been pressed.

Remedy:

Eliminate the malfunction that has caused the emergency switch to be actuated, and clear the error.

See also the functional description: "Emergency stop feature".

F634 - Attributes

H1 Display :		F6/34
Diag. mess.:	**DE**	F634 E-Stop aktiviert
	EN	F634 Emergency-Stop
	FR	F634 Arrêt d'urgence
	ES	F634 Parada de emergencia activada
	IT	F634 Stop per Emergenza
Mess. no.:		F634 (hex)
Error no:		634
Class:		Travel range

F822 Encoder 1 failure: signal too small

The analog signals of an motor measurement system are used for high resolution analysis of that measurement system. These are monitored according to two criteria:

1. The pointer length, which is calculated from the sine and cosine signals, must equal at least.> 1 V.
2. The maximum pointer length resulting from the sine and cosine ignals must not exceed 11.8 V.

$$\text{pointer length} = \sqrt{\sin^2 + \cos^2}$$

Fig. 0-1: Pointer length

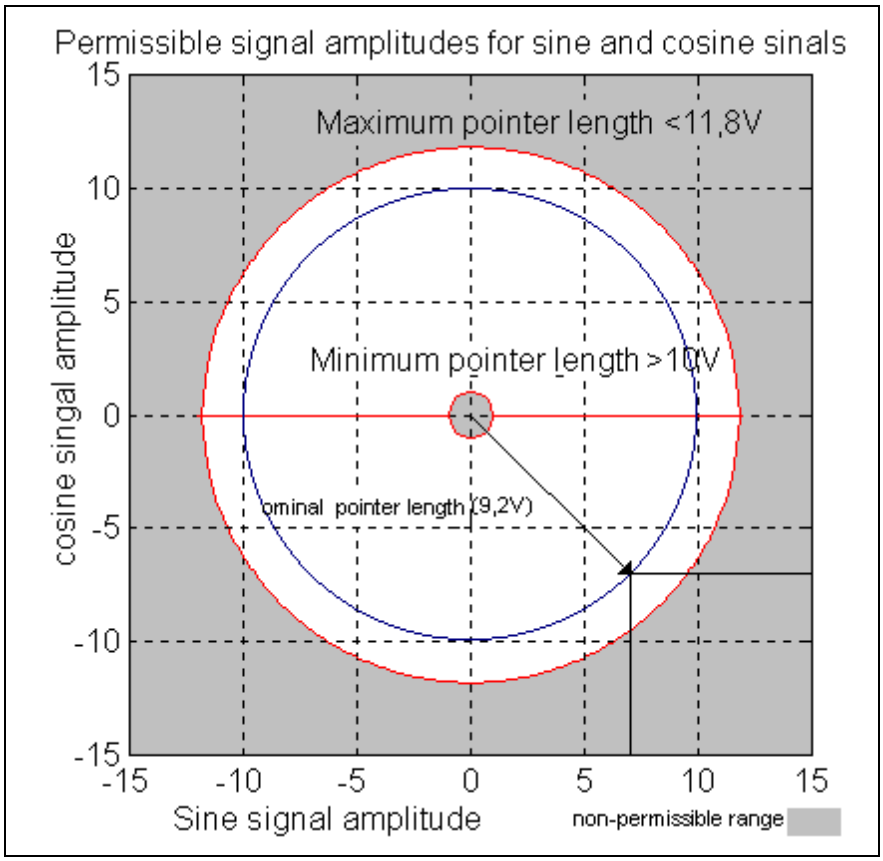

Fig. 0-2: Correct signal amplitude

Example:

Ucos = -6,5V

Usin = 6,5V

$$\text{pointer length} = \sqrt{(-6.5\text{V})^2 + 6.5\text{V}^2} \approx 9.2\text{V}$$

Note: The error cannot be cleared in communications phase 4. Before clearing the error, switch to communications phase 2.

Remedy:

- Check the measurement system cable.
- Lay the feedback cable well away from the motor power cable. The cover must be placed over the drive controller (see drive controller project specifications.)
- Check the measurement system and exchange, if necessary.

F822 - Attributes

H1 Display : F8/22

Diag. mess.:
DE F822 Fehler Geber 1: Signalamplitude fehlerhaft
EN F822 Encoder 1 failure: signal too small
FR F822 Erreur codeur 1: signal trop faible
ES F822 Error de encoder 1: señal pequeña
IT F822 Errore Encoder 1: Ampiezza troppo bassa

Mess. no.: F822 (hex)

Error no: 822

Class: Fatal

F827 Drive interlock while drive activated

Cause:

The drive interlock was activated while controller enable was set. The drive controller switches to torque-free state immediately.

Remedy:

The drive interlock should not be activated when controller enable is set. Check the control system of the drive interlock input.

F827 - Attributes

H1 Display : F8/27

Diag. mess.:
DE F827 Anlaufsperre bei gesetzter Reglerfreigabe
EN F827 Drive interlock while drive activated
FR F827 Démarrage bloqué pendant RF = 1
ES F827 Bloqueo de marcha cuando el accionamiento está activado
IT F827 Drive bloccato durante Abilatazione

Mess. no.: F827 (hex)

Error no: 827

Class: Fatal

F860 Overcurrent: short in power stage

The current in the power transistor bridge has exceeded twice the peak current of the drive. As a result, the drive will immediately switched to a torque-free state. An optional brake is immediately activated.

Cause:

1. Short circuit in the motor cable.
2. Defective power section of the drive controller
3. The current regulator was parameterized with wrong values.

Remedy:

For 1. Check the motor cable for a short.

For 2. Exchange the drive controller.

For 3. The current regulator parameters should not deviate from the default values of the feedback.

F860 - Attributes

H1 Display : F8/60

Diag. mess.:
DE F860 Brückensicherung
EN F860 Overcurrent: short in power stage
FR F860 Courant excessif: Court circuit à l'étage puissance
ES F860 Seguro en puente
IT F860 Sovracorr.: Corto Circuito nello Stadio di Potenza

Mess. no.: F860 (hex)

Error no: 860

Class: Fatal

F861 Overcurrent: short to ground

The phase current sum is monitored. Sum = 0 in normal mode. The ground-fault fuse responds if the current sum exceeds 0.5 x I_N.

Cause:

1. Defective motor cable.
2. Ground fault in the motor.

Remedy:

Check motor cable and motor for ground fault; replace if necessary.

F861 - Attributes

H1 Display : F8/61

Diag. mess.:
DE F861 Erdschluss-Sicherung
EN F861 Overcurrent: short to ground
FR F861 Courant excessif: Court circuit à terre
ES F861 Seguro de conexión a tierra
IT F861 Sovracorr.: Corto Circuito verso Terra

Mess. no.: F861 (hex)

Error no: 861

Class: Fatal

F862 No acknowledge of gear stage

When switching gears, the auxiliary contactors are directly controlled by the controller. The successful transition is signalled to controller by means of control signals.

Cause:

The conducted gear transition was not acknowledged within 10 seconds after the transition procedure was initiated.

Remedy:

- Check electrical wiring to make sure that the layout is as described in section "Automatic Gearshift"
- Check mechanical functions of gearmotor and switching gears.

see also the functional description: "Automatic Gearshift"

F862 - Attributes

H1 Display : F8/62

Diag. mess.:
DE F862 Quittierung Getriebestufe fehlt
EN F862 No acknowledge of gear stage
FR F862 Pas de confirmation pour stage d'engrenages
ES F862 Falta confirmación de nivel de engranaje
IT F862 Stadio del Riduttore non confirmato

Mess. no.: F862 (hex)

Error no: 862

Class: Fatal

F863 No acknowledge of windings switchover

When switching the windings, the auxiliary contactors are directly controlled by the controller. Moreover, the successful transition is signalled to controller by means of electrical signals.

Cause:

The conducted windings transition has not been acknowledged within 2 seconds after the transition procedure was initiated.

Remedy:

- Check the electrical wiring to make sure it is laid out as per section "Automatic Star-Delta-Switch"
- Check the mechanical function of the contactor switch.

See also the functional description: "Automatic Star-Delta-Switch".

F863 - Attributes

H1 Display : F8/63

Diag. mess.:
DE F863 Quittierung Wicklungsumschaltung fehlt
EN F863 No acknowledge of windings switchover
FR F863 Pas de confirmation pour changement de bobine
ES F863 Falta confirmación de cambio de bobina
IT F863 Cambiamento Bobina non confirmato

Mess. no.: F863 (hex)

Error no: 863

Class: Fatal

F869 +/-15Volt DC error

The drive controller found a malfunction in the ± 15 V power supply.

Cause:

1. Defective control voltage bus cable.
2. Defective supply module.

Remedy:

For 1. Check the control voltage bus cable or plug connection and exchange if necessary.

For 2. Check supply module (see supply moduleinstructions for use).

F869 - Attributes

H1 Display : F8/69

Diag. mess.: **DE** F869 +/- 15Volt-Fehler
EN F869 +/-15Volt DC error
FR F869 Erreur +/-15V
ES F869 +/-15Volt Error
IT F869 Guasto +/-15Volt

Mess. no.: F869 (hex)

Error no: 869

Class: Fatal

F870 +24Volt DC error

The drive controller requires a 24-V control voltage. The drive's torque is released immediately when the maximum permissible tolerance of +-20% is exceeded. An optional blocking brake is activated.

Cause:

1. Defective **cable** for the control voltages.
2. 24-V power supply **overload**.
3. Defective power **supply unit**.
4. **Short-circuit** in the emergency stop circuit.

Remedy:

Ref. 1. Check and, if necessary, replace the cable and connections of the control voltages.

Ref. 2. Check the 24-V power at the power supply unit.

Ref. 3. Check the power supply unit.

Ref. 4. Check the emergency stop circuit for a short-circuit.

Note: This error can only be cleared in parametrization mode (phase 2). As a result of this error, the encoder emulation is switched off.

F870 - Attributes

H1 Display : F8/70

Diag. mess.: **DE** F870 +24Volt-Fehler
EN F870 +24Volt DC error
FR F870 Erreur +24V
ES F870 +24Volt Error
IT F870 Guasto +24Volt

Mess. no.: F870 (hex)

Error no: 870

Class: Fatal

F871 +10Volt DC error

The power supply voltage for the current sensors has been disrupted.

Cause:

A defect in the drive controller.

Remedy:

Exchange the drive controller.

F871 - Attributes

H1 Display :		F8/71
Diag. mess.:	**DE**	F871 +10Volt-Fehler
	EN	F871 +10Volt DC error
	FR	F871 Erreur +10V
	ES	F871 +10Volt Error
	IT	F871 Guasto +10Volt
Mess. no.:		F871 (hex)
Error no:		871
Class:		Fatal

F878 Velocity loop error

The velocity loop monitor will appear when the following conditions occur simultaneously:

- The current command value is at the peak current limit.
- The difference between the actual velocity and the command velocity is greater than 2,5 % of the maximum motor velocity.
- actual speed > 1.25 % of maximum speed
- Command and actual acceleration have different qualifying signs.

Cause:

1. Motor cable is connected incorrectly.
2. Defective controller section of the drive
3. Defective feedback
4. Velocity loop paramaterized incorrectly
5. Incorrect commutation offset

Remedy:

For 1. Check the motor cable connection.

For 2. Exchange the drive controller.

For 3. Exchange the motor.

For 4. Check the velocity controller to see whether it is within operational parameters.

For 5. Exchange the motor.

See also the functional description: "Determining the Velocity Controller Setting".

F878 - Attributes

H1 Display : F8/78

Diag. mess.:
DE F878 Fehler im Drehzahlregelkreis
EN F878 Velocity loop error
FR F878 Erreur dans la boucle de vitesse
ES F878 Error en el círculo de regulación de velocidad
IT F878 Errore nell'Anello di Velocità

Mess. no.: F878 (hex)

Error no: 878

Class: Fatal

F879 Velocity limit S-0-0091 exceeded

In torque control, the actual velocity is monitored. This error is generated if the programmed velocity in the **S-0-0091, Bipolar velocity limit value** parameter is exceeded by the 1.125-fold value or a minimum of 100 rpm (rotary motor) or by 100 mm/min (linear motor).

Cause:

The torque command value was for too long a time greater than the load torque. This causes the actual speed to increase up to the maximum possible motor speed.

Remedy:

Assign the correct torque command value for the required task. Reduce the **S-0-0092, Bipolar torque/force limit value** parameter value.

See also the functional description "Limiting to bipolar velocity limit value".

F879 - Attributes

H1 Display : F8/79

Diag. mess.:
DE F879 Geschwindigkeits-Grenzwert S-0-0091 überschritten
EN F879 Velocity limit S-0-0091 exceeded
FR F879 Limite de vitesse S-0-0091 dépassée
ES F879 Valor límite de velocidad S-0-0091 excedido
IT F879 Valore di Massimo di Velocità S-0-0091 superato

Mess. no.: F879 (hex)

Error no: 879

Class: Fatal

1.3 Warning Diagnostic Messages

E201 No mains connected

Cause:

After the control voltage has been switched on, the drive checks to see if the mains connection of the power supply has also been switched on. This warning is given if this has not happened correctly.

Remedy:

Check power connections (external relay, fuse, etc.).

E201 - Attributes

H1 Display :		E2/01
Diag. mess.:	**DE**	E201 Netzanschluss Leistungsteil fehlt
	EN	E201 No mains connected
	FR	E201 Alimentation puissance non branchée
	ES	E201 No hay conexión de red
	IT	E201 Alimentazione di Potenza manca
Mess. no.:		E201 (hex)
Class:		Not fatal

E202 Not ready for power on

Cause:

As usually happens, the main contactor K1 was turned off when the controller enable was not set. Because of the drive controller capacities, the DC bus voltage must not decrease suddenly after the main contactor is turned off. This message is generated as long as the DC bus voltage > 250V and prevents the main contactor from being turned on. This serves to protect discharging resistors.

Remedy:

The warning is automatically recalled by the drive controller when the DC bus voltage falls below 250V.

E202 - Attributes

H1 Display :		E2/02
Diag. mess.:	**DE**	E202 Nicht bereit zur Leistungszuschaltung
	EN	E202 Not ready for power on
	FR	E202 Entraînement pas prêt pour mise sous puissance
	ES	E202 No está listo para conectar potencia
	IT	E202 Non Pronto per Inserzione Potenza
Mess. no.:		E202 (hex)
Class:		Not fatal

E219 Warning Drive temp. surveillance defective

Temperature monitoring checks to see if the measured drive controller temperature is within reasonable bounds. If it determines that it is lower than -10°C, then it is assumed the measuring unit is defective. Warning **E219 Warning Drive temp. surveillance defective** will appear for 30 seconds. Afterwards the drive will be brought to a standstill according to the selected error response and message **F220 Bleeder overload shutdown** will be generated.

Cause:

Broken cable in the drive controller, or defective sensor.

Remedy:

Exchange or repair the drive controller.

E219 - Attributes

H1 Display : E2/19

Diag. mess.:
DE E219 Warnung Verstärker-Temp.überwachung defekt
EN E219 Warning Drive temp. surveillance defective
FR E219 Alerte erreur dans la surveillance température ampli
ES E219 Aviso control de temperatura de amplificador defectuoso
IT E219 Preallarme Difetto nel Sovratemp. Azionamento

Mess. no.: E219 (hex)

Class: Not fatal

E221 Warning Motor temp. surveillance defective

Temperature monitoring checks to see if the measured motor temperature is within reasonable bounds. If it determines that it is lower than -10°C, then it is assumed the measuring unit is defective. Warning **E221 Warning Motor temp. surveillance defective** will appear for 30 seconds. Afterwards the drive controller will be brought to a standstill according to the selected error response and message **F221 Error Motor temp. surveillance defective** will be generated.

Cause:

1. Motor temperature sensor not connected.
2. Broken cable.
3. Defective sensor.
4. Broken cable in drive controller.

Remedy:

For 1. Connect the sensor to the drive controller and to the motor (see project planning specifications for the motor).
For 2. Exchange the wiring between the drive controller and the motor.
For 3. Exchange the motor.
For 4. Exchange the drive controller.

See also the functional description: "Temperature monitoring".

E221 - Attributes

H1 Display : E2/21

Diag. mess.:
DE E221 Warnung Motor-Temp.überwachung defekt
EN E221 Warning Motor temp. surveillance defective
FR E221 Alerte erreur dans la surveillance température moteur
ES E221 Aviso control de temperatura de motor defectuoso
IT E221 Preallarme Difetto nel Sovratemp. Motore

Mess. no.: E221 (hex)

Class: Not fatal

E225 Motor overload

The maximum possible motor current is reduced in order to protect the motor from being destroyed.

If a current flows in the that is greater than 2.2 times the motor current at standstill S-0-0111, the maximum possible motor current **(S-0-0109, Motor peak current)** is reduced. With 4-fold motor current at standstill, the reduction starts after 400 ms. With 5-fold current it starts earlier, and with 3-fold current later.

The **E225 Motor overload** warning is issued when the motor peak current is reduced by the limitation.

The reduction also has an effect on the **P-0-4045, Active permanent current**.

See also the functional description: "Current Limit"

E225 - Attributes

H1 Display :		E2/25
Diag. mess.:	**DE**	E225 Motor-Überlast
	EN	E225 Motor overload
	FR	E225 Surcharge Moteur
	ES	E225 Sobrecarga de motor
	IT	E225 Sovracarico Motore
Mess. no.:		E225 (hex)
Class:		Not fatal

E226 Undervoltage in power section

If bit 5 of the **P-0-0118, Power off on error** parameter has been set, an undervoltage condition will be handled as a nonfatal warning. The drive issues this warning if the drive enabling signal is present and the DC bus voltage message disappears.

Cause:

Power supply unit is switched off or mains failure occurs while the drive enabling signal is set.

Remedy:

Switch off the drive enabling signal before you switch off the power supply unit.

E226 - Attributes

H1 Display :		E2/26
Diag. mess.:	**DE**	E226 Unterspannung im Leistungsteil
	EN	E226 Undervoltage in power section
	FR	E226 Sous-tension puissance
	ES	E226 Tensión baja en parte de potencia
	IT	E226 Errore Alimentazione bassa nello Stadio di Potenza
Mess. no.:		E226 (hex)
Class:		Not fatal

E247 Interpolation velocity = 0

The drive-internal position command value interpolator is active if

- the "drive-internal interpolation" mode,
- the "relative drive-internal interpolation" mode,
- drive-controlled homing,
- Jog
- drive halt
- Process block mode is active.

The E247 warning is issued if the employed velocity specification is 0. Possible velocity specifications are:

- **S-0-0259, Positioning velocity**
- **S-0-0041, Homing velocity**
- **S-0-0091, Bipolar velocity limit value**
- **P-0-4030, Jog velocity**
- **P-0-4007, Process block velocity**

See also the functional description: "Mode: Drive Internal Interpolation"

E247 - Attributes

H1 Display :		E2/47
Diag. mess.:	**DE**	E247 Interpolationsgeschwindigkeit = 0
	EN	E247 Interpolation velocity = 0
	FR	E247 Vitesse d'interpolation = 0
	ES	E247 Velocidad de interpolación = 0
	IT	E247 Velocità per Interpolazione = 0
Mess. no.:		E247 (hex)

E248 Interpolation acceleration = 0

Cause:

The drive internal position command interpolator (profile generator) is active. It has been given the acceleration = 0. Without acceleration, it can never reach a given speed.

Operation modes with drive internal position command generation:

1. Drive-internal interpolation
2. Relative drive-internal interpolation
3. Drive-controlled homing
4. Drive Halt
5. Process block mode
6. jog

Remedy:

Input a reasonable value > 0 for the employed acceleration. Possible acceleration specifications, depending from the operation mode, are:

For 1, 2 and 6:	**S-0-0260**, **Positioning acceleration**	**>0**
For 3.:	**S-0-0042, Homing acceleration**	**>0**
For 4.:	**S-0-0138, Bipolar acceleration limit value**	**>0**
For 5.:	**P-0-4008, Process block Acceleration**	**>0**

See also the functional description: "Mode: Drive Internal Interpolation"

E248 - Attributes

H1 Display : E2/48

Diag. mess.:
DE E248 Interpolationsbeschleunigung = 0
EN E248 Interpolation acceleration = 0
FR E248 Accélération d'interpolation = 0
ES E248 Aceleración de interpolaciòn = 0
IT E248 Accelerazione per Interpolazione = 0

Mess. no.: E248 (hex)

E249 Positioning velocity >= S-0-0091

Cause:

Operating modes with internal interpolation limit the positioning speed to that set in **S-0-0091, Bipolar velocity limit value.**

This applies to the following modes:

1. Drive Internal Interpolation
2. Relative drive-internal interpolation
3. Positioning Block Mode
4. Jogging

Recovery:

S-0-0259, Positioning Velocity

P-0-4007, Process block velocity

P-0-4030, Jog velocity verringern

Also see functional description: "Operating Mode: Drive Internal Interpolation".

E249 - Attributes

H1 Display : E2/49

Diag. mess.:
DE E249 Positioniergeschw. >= S-0-0091
EN E249 Positioning velocity >= S-0-0091
FR E249 Vitesse de positionnement >= S-0-0091
ES E249 Velocidad de posicionamiento >= S-0-0091
IT E249 Velocità Posiz. >= S-0-0091

Mess. no.: E249 (hex)

Class: Not fatal

E250 Drive overtemp. prewarning

The temperature of the heatsink in the drive controller has reached the maximum permissible temperature. The drive controller follows the command value input for a period of 30 seconds. This makes it possible to bring the axis to a standstill with the control system while keeping true to the process (for example, close the operation, leave the collision area, etc.).

After 30 seconds, the response set in parameter **P-0-0119, Best possible deceleration** will be performed by the drive controller.

Cause:

1. Failure of the drive's internal blower.
2. Failure of the control cabinet's climate control.
3. Incorrect control cabinet dimensioning in regards to heat dissipation.

Remedy:

For 1. If the blower fails, exchange the drive controller.

For 2. Install climatization feature in the cabinet.

For 3. Check the dimensions of the control cabinet.

See also the functional description:"Current Limit"

E250 - Attributes

H1 Display :		E2/50
Diag. mess.:	**DE**	E250 Verstärker Übertemp.-Vorwarnung
	EN	E250 Drive overtemp. prewarning
	FR	E250 Préalerte surchauffe ampli
	ES	E250 Aviso exceso de temperatura de accionamiento
	IT	E250 Preallarme Sovratemp. Azionam.
Mess. no.:		E250 (hex)
Class:		Not fatal

E251 Motor overtemp. prewarning

The motor is too hot. The motor temperature, which is displayed in parameter **S-0-0383, Motor temperature**, has exceeded the value in **S-0-0201, Motor warning temperature**. Warning E251 is generated. If the temperature increases above the value in **S-0-0204, Motor shutdown temperature**, error **F219 Motor overtemp. shutdown** will be generated.

The values for parameters **S-0-0201, Motor warning temperature** and **S-0-0204, Motor shutdown temperature** are set at 140°C and 150°C for MKD and MDD motors respectively.

Set MDD, MKD and MKE motors to 145°C or 155°C.

Cause:

The motor became overloaded. The effective torque required of the motor was above the permissible continuous standstill torque for too long.

Remedy:

Check the layout of the motor. For systems which have been in use for a long time, check to see if the drive controller conditions have changed (in regards to pollution, friction, components which have been moved, etc.).

See also the functional description: "Temperature monitoring"

E251 - Attributes

H1 Display :		E2/51
Diag. mess.:	**DE**	E251 Motor Übertemp.-Vorwarnung
	EN	E251 Motor overtemp. prewarning
	FR	E251 Préalerte surchauffe moteur
	ES	E251 Aviso exceso de temperatura de motor
	IT	E251 Preallarme Sovratemp. Motore
Mess. no.:		E251 (hex)
Class:		Not fatal

E253 Target position out of travel range

In operation modes with drive ontrolled interpolation, the drive checks **before the move** whether the specified **S-0-0258, Target position**, is within the possible travel range of the drive. This range is defined by the parameters **S-0-0049, Positive position limit value** and **S-0-0050, Negative position limit value**. The position limit check is activated in the parameter **S-0-0055, Position polarities** with bit 4.

Cause:

The target position lies beyond the position limits, and the position limit check is activated.

Results:

- This warning message, E253, appears.
- The **drive stops**.
- The drive does not accept the target position or the process block.
- In **S-0-0012, Class 2 diagnostic** warning bit 13 is set.

Remedy:

1. For the Drive controlled interpolation mode, input the **S-0-0258, Target position** only within the position limits.
2. For the Relative drive controlled interpolation mode, do the same, outgoing from the actual position.
3. For the Process block mode, input the **S-0-4006 Process block target position** only within the position limits.
4. For relative process blocks, do the same, outgoing from the actual position.
5. Check the **position limit values**. Moreover, the positive position limit value must be greater than the negative position limit value.
6. If you don't need the position limit check, de-activate it, e.g. in modulo mode.

See also the functional description: "Mode: Drive Internal Interpolation".

E253 - Attributes

H1 Display :		E2/53
Diag. mess.:	**DE**	E253 Zielposition außerhalb des Verfahrbereichs
	EN	E253 Target position out of travel range
	FR	E253 Position à atteindre hors limites
	ES	E253 Posición objeto fuera campo de desplazamiento
	IT	E253 Posizione inpostata fuori dai Limiti
Mess. no.:		E253 (hex)
Class:		Not fatal

E255 Feedrate-override S-0-0108 = 0

With the parameter **S-0-0108, Feedrate override**, the travel velocity of all in drive-controlled travel commands can be changed proportionally (in %).

If the value of this parameter is 0, the travel velocity is also 0. With velocity = 0, however, the drive can never go anywhere. It cannot follow the applied command values.

Causes:

1. The parameter **S-0-0108, Feedrate override** is **0**.
2. For devices with analog inputs: Feedrate override via analog input is activated, and the voltage there is 0.
3. The **feed potentiometer** of the connected control system is at 0 or is being evaluated incorrectly. Like 4.

Remedies:

For 1.: Set **Feedrate override > 0**, so that the drive moves. Full speed is attained with 100% .

For 2.: Apply a voltage > 0 proportional to the desired speed,
+10V corresponds to 100 % (full) speed.
Alternative: De-activate Feedrate override.

For 3.: Turn the feed potentiometer cautiously, check the analog signal and the evaluation for it.

See also the functional description: "Sequence control "Drive-Controlled Homing"".

E255 - Attributes

H1 Display :		E2/55
Diag. mess.:	**DE**	E255 Feedrate-Override S-0-0108 = 0
	EN	E255 Feedrate-override S-0-0108 = 0
	FR	E255 Atténuation d'avance S-0-0108 = 0
	ES	E255 Override de alimentación S-0-0108 = 0
	IT	E255 Riduzione Velocità Avanz. S-0-0108 = 0
Mess. no.:		E255 (hex)
Class:		Not fatal

E257 Continuous current limit active

The thermal controller load is monitored. If a rated current profile is demanded of the drive controller which would require too high a power transistor load over time (too much warming of the power output stage), the drive controller will react by dynamically reducing the effective peak current. This warning will be given at the same time. Parameter **P-0-4046, Active peak current** is reduced. Before the peak current is actually limited, the advance warning message **E261 Continuous current limitation prewarning** should have been generated.

Cause:

The drive controller was overloaded.

Remedy:

1. Check the drive layout.
2. Reduce acceleration.

   With systems which have been used for longer periods of time, check to see if drive controller conditions have changed in regards to:

   - Friction
   - Components which have been moved.

See also the functional description: "Current Limit"

E257 - Attributes

H1 Display :		E2/57
Diag. mess.:	**DE**	E257 Dauerstrombegrenzung aktiv
	EN	E257 Continuous current limit active
	FR	E257 Courant permanent limité
	ES	E257 Límite de corriente continua activo
	IT	E257 Limitazione Corr. continuativa attiva
Mess. no.:		E257 (hex)
Class:		Not fatal

E259 Command velocity limit active

In the position control and velocity control operating modes, the effective velocity command value is limited to the value in parameter **S-0-0091, Bipolar velocity limit value**. The warning is given if the resulting velocity command value reaches this limit.

Cause:

Parameter **S-0-0091, Bipolar velocity limit value** was set too low.

Remedy:

In normal operating conditions, set parameter **S-0-0091, Bipolar velocity limit value** to a value 10% greater than the NC effective velocity.

See also the functional description: "Limiting to bipolar velocity limit value".

E259 - Attributes

H1 Display :		E2/59
Diag. mess.:	**DE**	E259 Geschwindigkeitssollwertbegrenzung aktiv
	EN	E259 Command velocity limit active
	FR	E259 Vitesse de consigne limitée
	ES	E259 Límite de valor nominal de velocidad activo
	IT	E259 Limitazione Velocità comandata attiva
Mess. no.:		E259 (hex)
Class:		Not fatal

E261 Continuous current limit prewarning

Digital drives are monitored by a continually operating temperature model. If the thermal load reaches 100%, the continuous current limit will be activated shortly thereafter.
Before the torque is reduced, a continuous current limit early warning is given via a switching threshold, which is determined by parameter **P-0-0127, Overload warning**.
To deactivate the warning, enter **P-0-0127** = 100% into the parameter.

Cause:

The drive controller was overloaded.

Remedy:

1. Check the drive layout.
2. Reduce acceleration.
3. Increase the switching threshold in parameter **P-0-0127, Overload warning**
4. With systems which have been used for longer periods of time, check to see if drive controller conditions have changed in regards to:
   - Friction
   - Components which have been moved
   - Feed during processing.

See also the functional description: "Current Limit"

E261 - Attributes

H1 Display :		E2/61
Diag. mess.:	**DE**	E261 Dauerstrombegrenzung Vorwarnung
	EN	E261 Continuous current limit prewarning
	FR	E261 Préalerte limite de courant perm.
	ES	E261 Preaviso límite corriente continua
	IT	E261 Preallarme Limitazione Corrente contin.
Mess. no.:		E261 (hex)
Class:		Not fatal

E263 Velocity command value > limit S-0-0091

Cause:

The value given to the drive for **S-0-0036, Velocity command value** was greater than permissible.

Remedy:

It is limited to **S-0-0091, Bipolar velocity limit value**.

See also the functional description: "Mode: Velocity Control"

E263 - Attributes

H1 Display : E2/63

Diag. mess.:
DE E263 Geschwindigkeitssollwert > Grenzwert S-0-0091
EN E263 Velocity command value > limit S-0-0091
FR E263 Vitesse consigne > limite S-0-0091
ES E263 Velocidad nominal mayor que S-0-0091
IT E263 Velocità comandata > S-0-0091

Mess. no.: E263 (hex)

Class: Not fatal

E264 Target position out of num. range

Cause:

In modes:

- drive-internal interpolation,
- relative interpolation and
- positioning block mode

the previous target position in the internal position format cannot be illustrated.

Recover:

1. Check the given target position and correct, if necessary.
2. With infinitely turning axes it is necessary that the position data be illustrated in modulo format.
3. The absolute internally illustrable position can be enlarged by enlarging the maximum travel range.

E264 - Attributes

H1 Display : E2/64

Diag. mess.:
DE E264 Zielposition nicht darstellbar
EN E264 Target position out of num. range
FR E264 Position à atteindre hors des limites numériques
ES E264 Posición objeto fuera de límites
IT E264 Posizione selezionata fuori dai Limiti

Mess. no.: E264 (hex)

Class: Not fatal

E324 Option module error power supply unit

Cause:

A component that is connected to the HVE or HVR power supply unit reports a malfunction.

Remedy:

Check the option module, and replace it if necessary.

E324 - Attributes

H1 Display : E3/24

Diag. mess.:
DE E324 Zusatzkomponentenfehler Versorgungsmodul
EN E324 Option module error power supply unit
FR E324 Malfonction d'un composant optional dans l'alimentation
ES E324 Error en componente opcional en módulo alimentación
IT E324 Guasto in Modulo opz. del Alimentatore

Mess. no.: E324 (hex)

Class: Not fatal

E325 Recovery overload power supply unit

Cause:

The regenerated load of the drives is excessive.

Remedy:

Reduce permitted delays. Use a drive controller with smaller peak currents.

E325 - Attributes

H1 Display :		E3/25
Diag. mess.:	**DE**	E325 Rückspeise-Überlast Versorgungsmodul
	EN	E325 Recovery overload power supply unit
	FR	E325 Surcharge rétroalimentation dans l'alim. puissance
	ES	E325 Sobrecarga retroalimentaciòn
	IT	E325 Sovracarico Retroalimentazione nel Alimentatore
Mess. no.:		E325 (hex)
Class:		Not fatal

E326 Bus power overload

Error will be stored for no more than 500 ms!

Cause:

The input power required by the drives is excessive.

Remedy:

Reduce the permissible acceleration. Use drive controller with smaller peak current.

E326 - Attributes

H1 Display :		E3/26
Diag. mess.:	**DE**	E326 Einspeiseüberlast Versorgungsmodul
	EN	E326 Bus power overload
	FR	E326 Surcharge à l'entrée du module d'alimentation
	ES	E326 Potencia de bus sobrecargada
	IT	E326 Sovracarico a l'Entrata del Alimentatore
Mess. no.:		E326 (hex)
Class:		Not fatal

E350 Heat sink overtemp. warning power supply unit

The permissible heatsink temperature has been reached. The temperature prewarning contact is open. Power will be switched off after 30 s.

Cause:

1. Load too high
2. Ambient temperature too high
3. Cooling air is blocked
4. Blower in unit is defective

Remedy:

1. Reduce load
2. reduce control cabinet temperture
3. check cooling air ducts
4. replace unit.

E350 - Attributes

H1 Display : E3/50

Diag. mess.:
DE E350 Kühlkörper-Übertemp.-Warnung Versorgungsmodul
EN E350 Heat sink overtemp. warning power supply unit
FR E350 Alerte Surchauffe du module d'alimentation
ES E350 Alarma sobretemp. refrig. del módulo de alimentación
IT E350 Allarme Sovratemp. nel Alimentatore

Mess. no.: E350 (hex)

Class: Not fatal

E352 Bleeder overload warning power supply unit

Cause:

75% of the permissible bleeder ON time has been reached due to excessive regenerated power.

Remedy:

- permissible acceleration (delay) must be reduced
- reduce drive speed
- reduce peak current of the drive

E352 - Attributes

H1 Display : E3/52

Diag. mess.:
DE E352 Bleeder-Überlast-Warnung Versorgungsmodul
EN E352 Bleeder overload warning power supply unit
FR E352 Alerte Surcharge bleeder dans le module d'alim.
ES E352 Alarma sobrecarga de bleeder del módulo de alimentación
IT E352 Allarme Sovracarico Bleeder nel Alimentatore

Mess. no.: E352 (hex)

Class: Not fatal

E353 Diagnostic message power supply erroneous

The power supply unit HVE or HVR cyclically sends status and error messages via a serial connection to the connected controller. If the controllers do not receive several sequential messages, then this warning is generated.

Cause:

1. serial interface of power supply unit is defective
2. break in serial connection lines
3. serial interface of controller is defective

Remedy:

On 1. replace power supply unit.
On 2. check and replace bus cable, if necessary
On 3. replace controller, if necessary

E353 - Attributes

H1 Display : E3/53

Diag. mess.:
DE E353 Diagnose des Versorgungsmoduls fehlerhaft
EN E353 Diagnostic message power supply erroneous
FR E353 Diagnostique fausse du module d'alimentation
ES E353 Diagnóstico del módulo de alimentación erróneo
IT E353 Diagnostica falsa del Alimentatore

Mess. no.: E353 (hex)

Class: Not fatal

E387 Control voltage supply fault power supply unit

With HVE only !

Cause:

The power voltage supply in the HVE exceeds permissible tolerance (3x 380 ... 480V, ± 10 %).

Remedy:

Check mains fuse in control cabinet and replace, if necessary.

E387 - Attributes

H1 Display : E3/87

Diag. mess.:
DE E387 Ausfall Steuerspg.-Einspeisung Versorgungsmodul
EN E387 Control voltage supply fault power supply unit
FR E387 Manque d'alim. contrôle pour module d'alim.
ES E387 Fallo alimentación de control para módulo de alimentaci
IT E387 Guasto nell'Alim. di contr. per l'Alimentatore

Mess. no.: E387 (hex)

Class: Not fatal

E825 Overvoltage in power stage

The **DC bus voltage** is too high.

Cause:

1. During **braking** (decelerating): the energy reflected from the mechanical system via the motor was so high for a moment that it could not be sufficiently dissipated to heat by the braking resistor (bleeder). The regenerated current could not be drained and therefore charged the DC bus, so that the voltage there has become too high.
2. The **mains voltage** (AC input) is too high.

Result:

In case of overvoltage, the motor is switched to **torque-free** operation. As soon as the DC Bus voltage falls again below the maximum allowable value, the controller will be turned on again.

Remedy:

For 1. Reduce the **acceleration** values.
Check the drive controller layout, if necessary.
Install an auxiliary bleeder, if necessary.

For 2. Check the **mains supply voltage** (AC/3phase).

WARNING

⇒ Danger of high-voltage shock!
Care for protection against accidental touch.

E825 - Attributes

H1 Display :		E8/25
Diag. mess.:	**DE**	E825 Überspannung im Leistungsteil
	EN	E825 Overvoltage in power stage
	FR	E825 Tension excessive à l'étage puissance
	ES	E825 Sobretensión en la parte de potencia
	IT	E825 Sovratensione nello Stadio di Potenza
Mess. no.:		E825 (hex)
Class:		Fatal

E826 Undervoltage in power section

If the bit 3 is set in the parameter **P-0-0118, Power off on error**, the undervoltage is treated as "fatal warning“ with shutdown of the drive operation. If the drive enable is on at the same time, and the DC bus voltage indication goes down, the drive displays this warning.

Cause:

Switching off the power supply or mains failure while the drive enable is on.

Remedy:

Switch off the drive enable before switching off the supply unit.

E826 - Attributes

H1 Display :		E8/26
Diag. mess.:	**DE**	E826 Unterspannung im Leistungsteil
	EN	E826 Undervoltage in power section
	FR	E826 Sous-tension puissance
	ES	E826 Tensión baja en potencia
	IT	E826 Errore Alimentazione Bassa
Mess. no.:		E826 (hex)
Class:		Fatal

E834 Emergency-Stop

Pressing the emergency stop switch has caused the drive to perform the emergency stop function that had been selected via the **P-0-0119, Best possible deceleration** parameter. There is no error message issued to the controller.

Cause:

The emergency stop switch was pressed.

Remedy:

Eliminate the malfunction that led to the activation of the emergency stop switch. The warning will then disappear.

See also the functional description: "Emergency stop feature".

E834 - Attributes

H1 Display :		E8/34
Diag. mess.:	**DE**	E834 E-Stop aktiviert
	EN	E834 Emergency-Stop
	FR	E834 Arrêt d´urgence
	ES	E834 Parada de emergencia activada
	IT	E834 Stop per Emergenza
Mess. no.:		E834 (hex)

1.4 Command Diagnostic Messages

C100 Communication phase 3 transition check

The command **S-0-0127, C1 Communication phase 3 transition check** has been activated.

See also the functional description: "S-0-0127, C100 Communication phase 3 transition check"

C100 - Attributes

H1 Display : C1

Diag. mess.:
DE C100 Umschaltvorbereitung Phase 2 nach 3
EN C100 Communication phase 3 transition check
FR C100 Préparation commutation phase 2 vers 3
ES C100 Comprobación conmutación fase 2 a 3
IT C100 Fase di Comunicazione 3 test di Transizione

Mess. no.: C100 (hex)

C116 DAE not plugged in

For the process communication, the DAE plug-in module is necessary. However, the drive has not recognized any DAE.

C116 - Attributes

H1 Display : C1/16

Diag. mess.:
DE C116 DAE nicht gesteckt
EN C116 DAE not plugged in
FR C116 DAE non branchée
ES C116 DAE no conectado
IT C116 DAE manca

Mess. no.: C116 (hex)

Class: Command

C119 DEA4 not plugged in

A DEA4 plug-in module is needed for command communications. This drive is not acceptable.

C119 - Attributes

H1 Display : C1/19

Diag. mess.:
DE C119 DEA4 nicht gesteckt
EN C119 DEA4 not plugged in
FR C119 DEA4 non branchée
ES C119 DEA4 no conectado
IT C119 DEA4 manca

Mess. no.: C119 (hex)

Class: Command

C200 Communication phase 4 transition check

Meaning:

The command **S-0-0128, C200 Communication phase 4 transition check** has been activated.

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C200 - Attributes

H1 Display : C2

Diag. mess.:
DE C200 Umschaltvorbereitung Phase 3 nach 4
EN C200 Communication phase 4 transition check
FR C200 Préparation commutation phase 3 vers 4
ES C200 Comprobación comunicación fase 3 a 4
IT C200 Fase di Comunicazione 4 Test di Transizione

Mess. no.: C200 (hex)

C201 Invalid parameter(s) (->S-0-0022)

Cause:

Parameters which will be necessary to operate the drive in communications phase 4 are invalid. The invalid parameters can be seen in **S-0-0022, IDN list of invalid op. data for comm. ph. 3**.

Remedy:

The parameters of **S-0-0022, IDN list of invalid op. data for comm. ph. 3** must be rewritten so they are correct.

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C201 - Attributes

H1 Display : C2/01

Diag. mess.:
DE C201 Parametersatz unvollständig (->S-0-0022)
EN C201 Invalid parameter(s) (->S-0-0022)
FR C201 Paramètre(s) invalide(s) (->S-0-0022)
ES C201 Bloque de parámetro inválido (->S-0-0022)
IT C201 Parametro invalido (->S-0-0022)

Mess. no.: C201 (hex)

Class: Command

C202 Parameter limit error (->S-0-0022)

Cause:

Parameters which are necessary to operate the drive in communications phase 4 are outside of their minimum or maximum input values, or the entered value can't be processed (for bit bars). The incorrect parameters are listed in **S-0-0022, IDN list of invalid op. data for comm. ph. 3**.

Remedy:

The parameters of **S-0-0022, IDN list of invalid op. data for comm. ph. 3** must be rewritten with correct values.

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C202 - Attributes

H1 Display : C2/02

Diag. mess.:
DE C202 Parameter Grenzwertfehler (->S-0-0022)
EN C202 Parameter limit error (->S-0-0022)
FR C202 Erreur valeur limite paramètres (->S-0-0022)
ES C202 Error límite en parámetro (->S-0-0022)
IT C202 Errore Limite Parametro (->S-0-0022)

Mess. no.: C202 (hex)

Class: Command

C203 Parameter calculation error (->S-0-0022)

Cause:

Parameters that are required for phase-4 operation (operating mode) cannot be processed in that way. The incorrect parameters are listed in **S-0-0022, IDN List of Invalid Op. Data for Comm. Ph. 3**.

Remedy:

Write correct values to the parameters in **S-0-0022, IDN List of Invalid Op. Data for Comm. Ph. 3**.

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C203 - Attributes

H1 Display : C2/03

Diag. mess.:
DE C203 Parameter Umrechnungsfehler (->S-0-0022)
EN C203 Parameter calculation error (->S-0-0022)
FR C203 Erreur de calcul de paramètre (->S-0-0022)
ES C203 Error de cálculo en parámetro (->S-0-0022)
IT C203 Errore di Calcolo nel Parametro (->S-0-0022)

Mess. no.: C203 (hex)

Class: Command

C204 Motor type P-0-4014 incorrect

An MHD-, MKD or MKE motor (value 1 or 5) is entered into parameter **P-0-4014, Motor type**. The appropriate abbreviation "MHD", "MKD", or "MKE" however, was not found in parameter **S-7-0141, Motor type** in the motor feedback data memory.

Cause:

1. Incorrect parameter set for type of motor.
2. The motor feedback memory cannot be read.
3 motor feedback - not connected

Remedy:

For 1. Enter the type of motor used in parameter **P-0-4014, Motor type**

For 2. Check feedback connection.
If feedback is defective, exchange motor.

See also the functional description: "Automatic setting of the motor type for motors with feedback memory".

C204 - Attributes

H1 Display : C2/04

Diag. mess.:
DE C204 Motorart P-0-4014 fehlerhaft
EN C204 Motor type P-0-4014 incorrect
FR C204 Type de moteur P-0-4014 faux
ES C204 Tipo de motor P-0-4014 incorrecto
IT C204 Tipo di Motore P-0-4014 falso

Mess. no.: C204 (hex)

Class: Command

C210 Feedback 2 required (->S-0-0022)

Cause:

Values that require an optional encoder have been entered in **S-0-0147, Homing parameter** or in the **S-0-0032...35, Mode of Operation** parameters. However, 0 (not available) has been entered in the **P-0-0075, Interface Feedback 2, optional** parameter.

The ident number of the parameter that requires the optional encoder is entered in **S-0-0022, IDN List of Invalid Op. Data for Comm. Ph. 3**.

Remedy:

Modify **S-0-0147, Homing parameter** or the **S-0-0032...35, Mode of Operation** parameters to utilization of the motor encoder instead of optional encoder.

Set **P-0-0075, Interface Feedback 2, optional** to a value different from 0 to activate the optional measuring system.

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C210 - Attributes

H1 Display : C2/10

Diag. mess.:
DE C210 Geber 2 erforderlich (->S-0-0022)
EN C210 Feedback 2 required (->S-0-0022)
FR C210 Feedback 2 nécessaire (->S-0-0022)
ES C210 Requerida retroalimentación 2 (->S-0-0022)
IT C210 Richiesto Feedback 2 (->S-0-0022)

Mess. no.: C210 (hex)

Class: Command

C211 Invalid feedback data (->S-0-0022)

Invalid data has been encountered when the parameters stored in the motor feedback were read, or an error has occurred when the data was read.

Causes:

1. Motor feedback cable not connected or defective
2. Motor feedback defective
3. Drive controller defective

Remedy:

Ref. 1. Check motor feedback cable; connect both sides

Ref. 2. Replace motor

Ref. 3. Replace amplifier

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C211 - Attributes

H1 Display : C2/11

Diag. mess.:
DE C211 Ungültige Feedbackdaten (->S-0-0022)
EN C211 Invalid feedback data (->S-0-0022)
FR C211 Données feedback incorrectes (->S-0-0022)
ES C211 Datos de retroalimentación inválidos (->S-0-0022)
IT C211 Dati di Feedback invalidi (->S-0-0022)

Mess. no.: C211 (hex)

Class: Command

C212 Invalid amplifier data (->S-0-0022)

During drive initialization, the operating software fetches data from an EEPROM in the drive controller. This error message is generated after that access has failed.

Causes:

Defective hardware in the drive controller.

Remedy:

Replace drive controller.

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C212 - Attributes

H1 Display : C2/12

Diag. mess.:
DE C212 Ungültige Verstärkerdaten (->S-0-0022)
EN C212 Invalid amplifier data (->S-0-0022)
FR C212 Données variateur incorrectes (->S-0-0022)
ES C212 Datos de amplificador inválidos (->S-0-0022)
IT C212 Dati Azionamento invalidi (->S-0-0022)

Mess. no.: C212 (hex)

Class: Command

C213 Position data scaling error

Cause:

The scaling parameters for position data permit the position data display format to be selected. The drive-internal position data format depends on the employed motor encoder and the encoder resolution. The factor used for converting the position data from the drive-internal format into the display format or vice versa is outside the processable range, because either

- linear motor and rotary position scaling with motor reference, or
- rotary motor and linear position scaling with motor reference, or
- linear motor with modulo scaling has been selected; or
- the determined factor used for converting the position data from the display format to the internal format, and vice versa, cannot be represented.

Remedy:

Checking and correcting the relevant parameters, such as

- **S-0-0076, Position data scaling type**
- **S-0-0077, Linear position data scaling factor**
- **S-0-0078, Linear position data scaling exponent**
- **S-0-0079, Rotational position resolution**
- **S-0-0116, Resolution of motor feedback**
- **S-0-0121, Input revolutions of load gear**
- **S-0-0122, Output revolutions of load gear**
- **S-0-0123, Feed constant**
- **P-0-0074, Interface feedback 1**
- **S-0-0277, Position feedback 1 type parameter**

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C213 - Attributes

H1 Display :		C2/13
Diag. mess.:	**DE**	C213 Wichtung der Lagedaten fehlerhaft
	EN	C213 Position data scaling error
	FR	C213 Erreur calibrage données de position
	ES	C213 Error de escala de datos de posición
	IT	C213 Errore Taratura Dati Posizione
Mess. no.:		C213 (hex)
Class:		Command

C214 Velocity data scaling error

Cause:

The scaling parameters for velocity data permit the velocity data display format to be selected. The drive-internal velocity data format depends on the employed motor encoder and the encoder resolution. The factor used for converting the velocity data from the drive-internal format into the display format or vice versa is outside the processable range.

Remedy:

Checking and correcting the relevant parameters, such as

- **S-0-0044, Velocity data scaling type**
- **S-0-0045, Velocity data scaling factor**
- **S-0-0046, Velocity data scaling exponent**
- **S-0-0116, Resolution of motor feedback**
- **S-0-0121, Input revolutions of load gear**

- **S-0-0122, Output revolutions of load gear**
- **S-0-0123, Feed constant**
- **P-0-0074, Interface feedback 1**
- **S-0-0277, Position feedback 1 type parameter**

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C214 - Attributes

H1 Display : C2/14

Diag. mess.:
DE C214 Wichtung der Geschwindigkeitsdaten fehlerhaft
EN C214 Velocity data scaling error
FR C214 Erreur calibrage données de vitesse
ES C214 Error de escala de datos de velocidad
IT C214 Errore Taratura Dati di Velocità

Mess. no.: C214 (hex)

Class: Command

C215 Acceleration data scaling error

Cause:

The display format of the acceleration data can be set using acceleration scaling parameters. The drive-controlled format of the acceleration data is dependent on what motor encoder and encoder resolution are used. The factor for converting acceleration data from internal drive format to display format (or vice-versa) is outside the workable range.

Remedy:

Check and set the relevant parameters correctly as follows:

- **S-0-0160, Acceleration data scaling type**
- **S-0-0161, Acceleration data scaling factor**
- **S-0-0162, Acceleration data scaling exponent**
- **S-0-0116, Resolution of motor feedback**
- **S-0-0121, Input revolutions of load gear**
- **S-0-0122, Output revolutions of load gear**
- **S-0-0123, Feed constant**
- **P-0-0074, Interface feedback 1**
- **S-0-0277, Position feedback 1 type parameter**

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C215 - Attributes

H1 Display : C2/15

Diag. mess.:
DE C215 Wichtung der Beschleunigungsdaten fehlerhaft
EN C215 Acceleration data scaling error
FR C215 Erreur calibrage données d'accélération
ES C215 Error de escala de datos de aceleración
IT C215 Errore Taratura Dati Accelerazione

Mess. no.: C215 (hex)

Class: Command

C216 Torque/force data scaling error

Cause:

The display format of the torque/force data can be set using torque/force scaling parameters. The factor for converting torque data from drive-controlled format to display format (or vice-versa) is outside the workable area.

Remedy:

Check and set the relevant parameters correctly as follows:

- **S-0-0086, Torque/force data scaling type**
- **S-0-0093, Torque/force data scaling factor**
- **S-0-0094, Torque/force data scaling exponent**
- **S-0-0110, Amplifier peak current**
- **S-0-0111, Motor current at standstill**

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C216 - Attributes

H1 Display :		C2/16
Diag. mess.:	**DE**	C216 Wichtung der Drehmoment/Kraftdaten fehlerhaft
	EN	C216 Torque/force data scaling error
	FR	C216 Erreur calibrage données de couple/force
	ES	C216 Error de escala de datos de par/fuerza
	IT	C216 Errore Taratura Dati Coppia/Forza
Mess. no.:		C216 (hex)
Class:		Command

C217 Feedback1 data reading error

If you have entered these values into **P-0-0074, Interface feedback 1**:

- "1" for standard interface,
- "4" for DFF module, or
- "8" for DAG module (Endat)

then the attached encoder must have a feedback data memory. The values for the encoder resolution and the feedback type are taken from there. An error was discovered while reading these values.

Cause:

1. Defective motor feedback cable.
2. Defective motor feedback.

Remedy:

For 1. Check the motor feedback cable.

For 2. Exchange the motor.

See also the functional description "S-0-0128, C2 communication phase 4 transition check".

C217 - Attributes

H1 Display : C2/17

Diag. mess.:
DE C217 Fehler beim Lesen der Daten Geber 1
EN C217 Feedback1 data reading error
FR C217 Erreur lecture données feedback 1
ES C217 Error en lectura de datos encoder 1
IT C217 Errore nella Lettura dei Dati di Feedback 1

Mess. no.: C217 (hex)

Class: Command

C218 Feedback 2 data reading error

The initializatin of the measuring systems is done in the command **S-0-0128, C200 Communication phase 4 transition check**. If the measuring system to initialize has an intrinsic data memory, this memory is read.

The error C218 Feedback 2 data reading error is generated, if an additional optional encoder (encoder 2) is present and being evaluated (**P-0-0075 Feedback 2 type** other than 0) and if an error is discovered while reading the data.

Measuring systems with intrinsic data memory are :

- DSF/HSF/LSF and resolver, as well as
- measuring systems with Endat interface (from Heidenhain)

Cause:

1. Defective measurement system cable
2. Defective measurement system

Remedy:

For 1. Check the measurement system cable.

For 2. Exchange the measurement system.

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C218 - Attributes

H1 Display : C2/18

Diag. mess.:
DE C218 Fehler beim Lesen der Daten Geber 2
EN C218 Feedback 2 data reading error
FR C218 Erreur lecture données feedback 2
ES C218 Error en lectura de datos de retroalimentación 2
IT C218 Errore nella Lettura dati Feedback 2

Mess. no.: C218 (hex)

Class: Command

C220 Feedback 1 initializing error

A number of tests are performed when the motor encoder is initialized. An error was detected during this process. This error may be:

- Error while reading the angle rectification data
- Error while copying the angle rectification data
- Interruption of communication with the encoder
- Assembly error with the position of an initialization track
- Error while reading the analog signal of an initialization track
- Error in the pointer length of the analog signal of an initialization track
- Invalid offset between the high and low resolution track
- Error in the measuring system micro-controller

Cause:

1. Defective motor feedback **cable**
2. Defective motor **feedback**
3. Defective measurement system **interface**

Remedy:

For 1. Check the motor feedback cable.

For 2. Exchange the motor.

For 3. Exchange the measuring system interface, if it is a module, or the complete drive controller.

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C220 - Attributes

H1 Display :		C2/20
Diag. mess.:	**DE**	C220 Fehler bei Initialisierung Geber 1
	EN	C220 Feedback 1 initializing error
	FR	C220 Erreur initialisation feedback 1
	ES	C220 Error al inicializar encoder 1
	IT	C220 Errore nell' Inizializz. del Feedback 1
Mess. no.:		C220 (hex)
Class:		Command

C221 Feedback 2 initializing error

Several checks are performed during the initialization of an optional encoder. An error has been detected during this process. This error may be:

- Error while reading the angle rectification data
- Error while copying the angle rectification data
- Interruption of communication with the encoder
- Assembly error with the position of an initialization track
- Error while reading the analog signal of an initialization track
- Error in the pointer length of the analog signal of an initialization track
- Invalid offset between the high and low resolution track

- Error in the measuring system micro-controller
- With DAG 1.2: external 24V set for SSI interface

Cause:

1. External encoder cable defective.
2. Defective feedback.
3. Defective measurement system interface.

Remedy:

For 1. Check the optional feedback cable.

For 2. Exchange feedback.

For 3. Exchange the measuring system interface (module).

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C221 - Attributes

H1 Display :		C2/21
Diag. mess.:	**DE**	C221 Fehler bei Initialisierung Geber 2
	EN	C221 Feedback 2 initializing error
	FR	C221 Erreur initialisation feedback 2
	ES	C221 Error al inicializar retroalim. 2
	IT	C221 Errore nell' Inizializz. del Feedback 2
Mess. no.:		C221 (hex)
Class:		Command

C223 Input value for max. range too high

Cause:

An internal position resolution has been selected via the **S-0-0278, Maximum travel range** parameter that no longer guarantees a correct commutation of the motor.

Remedy:

Select a smaller value for the **S-0-0278, Maximum travel range** parameter.

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C223 - Attributes

H1 Display :		C2/23
Diag. mess.:	**DE**	C223 Eingabewert max. Verfahrbereich zu groß
	EN	C223 Input value for max. range too high
	FR	C223 Entrée excessive pour champs de course
	ES	C223 Valor de entrada máx. campo desplazamiento excesivo
	IT	C223 Valore troppo alta per Campo mass.
Mess. no.:		C223 (hex)
Class:		Command

C225 Coprocessor not ready for initialization

The drive controller has a coprocessor. This coprocessor is initialized during the transfer command. The coprocessor signals that it is ready for initialization. If it is not ready, this error is generated.

Cause:

Coprocessor failed.

Remedy:

Exchange the drive controller.

See also the functional description "S-0-0128, C2 communication phase 4 transition check".

C225 - Attributes

H1 Display :		C2/25
Diag. mess.:	**DE**	C225 Coprozessor nicht bereit zur Initialisierung
	EN	C225 Coprocessor not ready for initialization
	FR	C225 Coprocesseur non prêt pour initialisation
	ES	C225 Coprocesador no listo para inicialización
	IT	C225 Coprocessore non pronto per Inizializzazione
Mess. no.:		C225 (hex)
Class:		Command

C226 Coprocessor acknowledge failed

The drive controller has a coprocessor. This coprocessor is initialized during the transfer command. If the coprocessor does not confirm the initialization by the master processor, this error will be generated.

Cause:

The coprocessor failed.

Remedy:

Exchange the drive controller.

See also the functional description "S-0-0128, C2 communication phase 4 transition check".

C226 - Attributes

H1 Display :		C2/26
Diag. mess.:	**DE**	C226 Kein Acknowledge von Coprozessor
	EN	C226 Coprocessor acknowledge failed
	FR	C226 Erreur acquittement coprocesseur
	ES	C226 No hay confirmación de coprocesador
	IT	C226 Riconosc. Coprocessore fallita
Mess. no.:		C226 (hex)
Class:		Command

C227 Modulo range error

Cause:

The marginal conditions for modulo processing were not maintained.

See functional description: "Modulo processing marginal conditions".

C227 - Attributes

H1 Display : C2/27

Diag. mess.:
DE C227 Modulo-Bereichs-Fehler
EN C227 Modulo range error
FR C227 Erreur plage module
ES C227 Error de campo de módulo
IT C227 Errore nel Range del Modulo

Mess. no.: C227 (hex)

Class: Command

C228 Controller type S-0-0140 wrong

Several internal software settings are made based on parameter **S-0-0140, Controller type**. If the content of this parameter cannot be used, then this error will be generated.

Cause:

1. The controller type cannot be processed by this software.
2. Amplifier EEProm defective.

Remedy:

For 1. Contact Indramat.

For 2. Exchange/repair the control device.

See also the functional description "S-0-0128, C2 communication phase 4 transition check".

C228 - Attributes

H1 Display : C2/28

Diag. mess.:
DE C228 Regelgerätetyp S-0-0140 falsch
EN C228 Controller type S-0-0140 wrong
FR C228 Type de variateur S-0-0140 faux
ES C228 Tipo regulador S-0-0140 incorrecto
IT C228 Tipo di Azionamento S-0-0140 falso

Mess. no.: C228 (hex)

Class: Command

C230 Preselection of gearstages/Y-D-connection incomplete

If gear or winding transition is used, then each switchable parameter block must be assigned a gearstage or winding interconnection (Y or D).

Note: The gear transition cannot be simultaneously used with the Y-D- switch!

Cause:

The allocation of the winding interconnection is not complete.

Remedy:

Winding interconnection must be specified for each switchable parameter block!

see also the functional description: "Automatic Star-Delta-Switch"

C230 - Attributes

H1 Display : C2/30

Diag. mess.:
DE C230 Vorwahl Getriebestufen/Y-D-Schaltung unvollständig
EN C230 Preselection of gearstages/Y-D-connection incomplete
FR C230 Présélection d'engrenages/Connection Y-D incomplète
ES C230 Preselección niveles de engranaje/conexión Y-D incomple
IT C230 Preselezione di Riduttore/Connezione Y-D incompleta

Mess. no.: C230 (hex)

Class: Command

C231 Emulator not loadable

Cause:

The position emulator on the DAE02.1 interface is loaded from a ROM module according to the selection made in P-0-4020. With ELS firmware, the incremental encoder firmware is always loaded; P-0-4020 does not exist in this case. The loading process is monitored; this error message is generated in the event of a malfunction. The cause is a hardware defect on the DAE02.1 interface.

Remedy:

Replace the DAE02.1 interface.

C231 - Attributes

H1 Display : C2/31

Diag. mess.:
DE C231 Emulator lässt sich nicht laden
EN C231 Emulator not loadable
FR C231 Emulateur non chargeable
ES C231 No se puede cargar el emulador
IT C231 Emulatore non cargabile

Mess. no.: C231 (hex)

Class: Command

C232 Encoder 1 interface not present

Cause:

The encoder interface that was selected in the **P-0-0074, Interface feedback 1** parameter has not been installed or cannot be found by the drive, due to a defect.

Remedy:

Install or replace the selected encoder interface.

See also the functional description: "S-0-0127, C1 Communication Phase 3 Transition Check"

C232 - Attributes

H1 Display : C2/32

Diag. mess.:
DE C232 Geber 1 Interface nicht vorhanden
EN C232 Encoder 1 interface not present
FR C232 Interface du codeur 1 manque
ES C232 Interface de encoder 1 no existe
IT C232 Manca l'Interfaccia del Encoder 1

Mess. no.: C232 (hex)

Class: Command

C233 Encoder 2 interface not present

Cause:

The encoder interface that has been selected in the **P-0-0075, Interface Feedback 2, external** parameter has not been installed or is defective and can therefore not be recognized by the drive.

Remedy:

Install or replace the selected encoder interface.

See also the functional description: "S-0-0127, C1 Communication Phase 3 Transition Check"

C233 - Attributes

H1 Display : C2/33

Diag. mess.:
DE C233 Geber 2 Interface nicht vorhanden
EN C233 Encoder 2 interface not present
FR C233 Interface du codeur 2 manque
ES C233 Interface de encoder 2 no existe
IT C233 Manca l'Interfaccia del Encoder 2

Mess. no.: C233 (hex)

Class: Command

C234 Encoder combination not possible

Cause:

The encoder interface that has been selected in the **P-0-0075, Interface Feedback 2, optional** parameter cannot be supported by the drive; it has already been allocated to the motor encoder.

Remedy:

Select another **optional** encoder.

See also the functional description: "Determining the encoder interface of the optional encoder"

C234 - Attributes

H1 Display : C2/34

Diag. mess.:
DE C234 Geberkombination nicht möglich
EN C234 Encoder combination not possible
FR C234 Combinaison des capteurs impossible
ES C234 Combinación de encoderes imposible
IT C234 Combinazione Encoder non possibile

Mess. no.: C234 (hex)

Class: Command

C235 Load-side motor encoder with inductance motor only

Cause:

The functionality of the optional encoder can be defined in the **P-0-0185, Function of opt. encoder** parameter. If 'load-side motor encoder' has been selected as the function of the optional encoder, that function will only be supported for asynchronous motors.

Remedy:

Set the **P-0-4014, Motor type** parameter according to the employed motor type.

Check the **P-0-0185, Function of opt. encoder** parameter.

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C235 - Attributes

H1 Display : C2/35

Diag. mess.:
DE C235 Lastseitiger Motorgeber nur bei Asynchronmotor
EN C235 Load-side motor encoder with inductance motor only
FR C235 Codeur moteur coté charge seulement pour moteur async.
ES C235 Encoder de motor lado de carga sólo con motor asíncrono
IT C235 Encoder Lato Carica solo con Motore asincrono

Mess. no.: C235 (hex)

Class: Command

C236 Feedback 1 required (P-0-0074)

Cause:

A motor encoder is not required (P-0-0074 = 0) if a load-sided motor encoder has been selected via the **P-0-0185, Function of opt. encoder** parameter. However, **S-0-0147, Homing parameter** or the **S-0-0032...35, Mode of Operation** parameters contain values that require a motor encoder.

Remedy:

Change **S-0-0147, Homing parameter** or the **S-0-0032...35, Mode of Operation** parameters such that they are suitable for using an optional encoder.

Enter a value ≠ 0 in the **P-0-0074, Interface feedback 1** parameter to activate the motor encoder.

See also the functional description "S-0-0128, C200 Communication phase 4 transition check".

C236 - Attributes

H1 Display : C2/36

Diag. mess.:
DE C236 Geber 1 erforderlich (P-0-0074)
EN C236 Feedback 1 required (P-0-0074)
FR C236 Feedback 1 nécessaire (P-0-0074)
ES C236 Requerida encoder 1 (P-0-0074)
IT C236 Richiesto Feedback 1 (P-0-0074)

Mess. no.: C236 (hex)

Class: Command

C300 Command Set absolute measuring

Command **P-0-0012, C300 Command 'Set absolute measurement'** was activated by the control system in use.

See also the functional description: "Set absolute measuring"

C300 - Attributes

H1 Display : C3

Diag. mess.:
DE C300 Kommando Absolutmaß setzen
EN C300 Command Set absolute measuring
FR C300 Commande Calage origine absolue
ES C300 Comando Ajustar medición absoluta
IT C300 Comando Set Misura Assoluta

Mess. no.: C300 (hex)

C302 Absolute measuring system not installed

Command **P-0-0012, C300 Command 'Set absolute measurement'** was started without an absolute measuring system being present.

The command cannot be processed because no absolute measuring system is available.

Cause:

1. The command should not have been activated.
2. The contacted motor or the external measurement system was not executed as an absolute encoder.

Remedy:

For 1. Stop execution of the command.

For 2. Equip the motor or external measurement system with an absolute encoder function.

See also the functional description: "Set Absolute Measuring"

C302 - Attributes

H1 Display : C3/02

Diag. mess.:
DE C302 Kein absolutes Meßsystem vorhanden
EN C302 Absolute measuring system not installed
FR C302 Système de mesure absolue non disponible
ES C302 No existe sistema de medición absoluta
IT C302 Sistema di Misura assoluta non installato

Mess. no.: C302 (hex)

Class: Command

C400 Switching to parameter mode

The command for transition into parameter mode. Before editing parameters that can be edited only in parameter mode, this command must be processed.

See also the functional description: "Parametrization Mode - Operating Mode"

C400 - Attributes

H1 Display : C4

Diag. mess.:
DE C400 Umschalten auf Phase 2
EN C400 Switching to parameter mode
FR C400 Passage en phase 2
ES C400 Conmutación a fase 2
IT C400 Commutazione in Modo Parametri

Mess. no.: C400 (hex)

C401 Drive active, switching not allowed

Cause:

The command **C400 Command: Switch to parameter mode** has been started, although the drive enable is on.

Remedy:

End the command and turn off the drive enable, then the command can be started again.

See also the functional description: "Parametrization Mode - Operating Mode"

C401 - Attributes

H1 Display : C4/01

Diag. mess.:
DE C401 Antrieb aktiv, Umschalten nicht zulässig
EN C401 Drive active, switching not allowed
FR C401 Entraînement validé, passage impossible
ES C401 Accionamiento activo, conmutación no permitida
IT C401 Azionamento abilitato, Commut. non consentita

Mess. no.: C401 (hex)

Class: Command

C500 Reset class 1 diagnostic, error reset

The command for clearing errors, **S-0-0099, C500 Reset class 1 diagnostic** was activated by the control system in use. All drive internal errors are cleared. But before, the cause of the error must have been cleared.

See also the functional description: "Clearing errors"

C500 - Attributes

H1 Display : C5

Diag. mess.:
DE C500 Reset Zustandsklasse 1, Fehler rücksetzen
EN C500 Reset class 1 diagnostic, error reset
FR C500 RAZ classe d'état 1
ES C500 Reset diagnóstico clase 1, reset de error
IT C500 Cancellazione Errori Classe 1

Mess. no.: C500 (hex)

C501 Error delete only in parameter mode

Cause:

An attempt has been made of clearing the error **F822 Motor encoder failure: signal too small** in communication phase 4 (operating mode). This is only possible in communication phases < 4 (parameter setting mode).

Remedy:

1. Switch back the communication phase.
2. Activate the command again.

C501 - Attributes

H1 Display : C5/01

Diag. mess.:
DE C501 Fehler nur im Parametriermodus löschbar
EN C501 Error delete only in parameter mode
FR C501 Effacement erreur seulement en mode paramètre
ES C501 Borrar error solamente en modo de parámetro
IT C501 Cancell. permessa solo In Modo Parametri

Mess. no.: C501 (hex)

Class: Command

C600 Drive controlled homing procedure command

Command **S-0-0148, C600 Drive controlled homing procedure command** has been activated by the control system in use.

See also the functional description: "Drive-controlled homing"

C600 - Attributes

H1 Display : C6

Diag. mess.:
DE C600 Kommando Antriebsgeführtes Referenzieren
EN C600 Drive controlled homing procedure command
FR C600 Commande d'origine sous contrôle entraînement
ES C600 Comando referenciado controlado por accionamiento
IT C600 Procedura di Azzeramento Asse

Mess. no.: C600 (hex)

C601 Homing only possible with drive enable

Cause:

The controller enabling signal was not active when the program was started. This is not permitted.

Remedy:

1. Switch on the controller enable signal.
2. Start the command again.

See also the functional description: "Functions of the Control During Drive-Controlled Homing"

C601 - Attributes

H1 Display : C6/01

Diag. mess.:
DE C601 Referenzieren nur mit Reglerfreigabe möglich
EN C601 Homing only possible with drive enable
FR C601 Prise d'origine seulement avec entraînement validé
ES C601 Referenciado no posible sin desbloque de accionamiento
IT C601 Azzeramento solo possibile con Azion. Abilit.

Mess. no.: C601 (hex)

Class: Command

C602 Distance home switch - reference mark erroneous

Cause:

The evaluation of the homing switch has been activated. The distance between the positive homing switch edge and the reference mark that shall be interpreted is outside the valid range.

Remedy:

Read the value from the **S-0-0298, Reference cam shift by ...** parameter and enter it in the **S-0-0299, Home switch offset** parameter.

See also the functional description: "Connection of the Home switch"

C602 - Attributes

H1 Display : C6/02

Diag. mess.:
DE C602 Abstand Referenzschalter-Referenzmarke fehlerhaft
EN C602 Distance home switch - reference mark erroneous
FR C602 Erreur distance came origine top 0
ES C602 Error Distancia marca refer. de interr. puesta a cero
IT C602 Distanza errata tra camma di zero e Imp. Encod.

Mess. no.: C602 (hex)

Class: Command

C604 Homing of absolute encoder not possible

Command **S-0-0148, C600 Drive controlled homing procedure command** was activated. An absolute measuring system was selected using the encoder selection in **S-0-0147, Homing parameter**. This command can only run if command **P-0-0012, C300 Command 'Set absolute measurement'** has been previously activated.

Remedy:

First activate command **P-0-0012, C300 Command 'Set absolute measurement'**, and then start command **S-0-0148, C600 Drive controlled homing procedure command**. This procedure will define the absolute reference point.

See also the functional description: "Possible Error Messages During Drive-Controlled Homing"

C604 - Attributes

H1 Display :		C6/04
Diag. mess.:	**DE**	C604 Referenzieren mit Absolutmaßgeber nicht möglich
	EN	C604 Homing of absolute encoder not possible
	FR	C604 Prise d'origine avec codeur absolu impossible
	ES	C604 Referenciado de encoder absoluto no posible
	IT	C604 Azzer. dell' Encoder Assoluto non permesso
Mess. no.:		C604 (hex)
Class:		Command

C700 Basic load

With motors of the MHD, MKD and MKE series, the controller parameters for the connected motor that are stored in the controller are set to their default values by activating the controller parameters that are stored in the motor feedback. The drive controller issues the C7 message to indicate that the **C700 Basic load** command has been activated via the command parameter **S-0-0262, C700 Command basic load**.

Cause:

The command **C700 Basic load** has been activated.

See also the functional description "Load default"

C700 - Attributes

H1 Display :		C7
Diag. mess.:	**DE**	C700 Urladen
	EN	C700 Basic load
	FR	C700 Chargement initial
	ES	C700 Carga básica
	IT	C700 Caricamento iniziale
Mess. no.:		C700 (hex)

C702 Default parameters not available

With motors of the MHD, MKD and MKE series, adapting the control loops to the connected digital drive is done by activating the speed controller parameters that are stored in the motor feedback. The drive controller employs the **C702 Default parameters not available** message to signal that the **S-0-0262, C700 Command basic load** command has been activated, but that there is no data memory at the connected motor.

Remedy:

Order the parameter sheet of the employed motor from the INDRAMAT Service, and enter the parameters.

See also the functional description: "Error Conditions of the Load Default Settings Procedure"

C702 - Attributes

H1 Display : C7/02

Diag. mess.:
DE C702 Keine Defaultparameter vorhanden
EN C702 Default parameters not available
FR C702 Paramètres par défaut non disponibles
ES C702 Parámetros iniciales no disponibles
IT C702 Parametri Standard non disponibili

Mess. no.: C702 (hex)

Class: Command

C703 Default parameters invalid

Cause:

The default parameters are read from the motor feedback data memory. At least one of these parameters is invalid.

Remedy:

Check the connection to the motor feedback. Exchange the motor if necessary.

See also the functional description: "Error Conditions of the Load Default Settings Procedure"

C703 - Attributes

H1 Display : C7/03

Diag. mess.:
DE C703 Default-Parameter ungültig
EN C703 Default parameters invalid
FR C703 Paramètres par défaut invalides
ES C703 Parámetro inicial no válido
IT C703 Parametri Standard non validi

Mess. no.: C703 (hex)

Class: Command

C704 Parameters not copyable

Cause:

The default parameters in use are not compatible with this software version.

Remedy:

Please contact Indramat. Explain, which software version, which device and which motor type you have.

See also the functional description: "Error Conditions of the Load Default Settings Procedure"

C704 - Attributes

H1 Display : C7/04

Diag. mess.:
DE C704 Parameter nicht kopierbar
EN C704 Parameters not copyable
FR C704 Les paramètres ne peuvent pas être copiés.
ES C704 Parametros no se pueden copiar.
IT C704 Parametri non copiabili

Mess. no.: C704 (hex)

Class: Command

C705 Locked with password

The parameter **S-0-0267, Password** offers the possibility to set a **write protection** for the drive parameters. The diagnostic message **C705 Locked with password** indicates, that the command **C700 Basic Load** has been started, although the drive parameters are protected with the customer password.

See also the functional description: "Error Conditions of the Load Default Settings Procedure"

C705 - Attributes

H1 Display : C7/05

Diag. mess.:
DE C705 Verriegelt mit Passwort
EN C705 Locked with password
FR C705 Bloqué avec mot de passe
ES C705 Bloqueado con contraseña
IT C705 Bloccato con parola chiave

Mess. no.: C705 (hex)

Class: Command

C800 Default parameter load

How to start the command:

This command can be started in 2 ways:

1. When "PL" is displayed on the drive controller (appears after a change in firmware version), by pressing the S1 button beneath the display.
2. By starting the **P-0-4094, C8 Default parameter load**

What the command does:

All the **parameters are** cleared and preset with their default (initial) value. Process blocks and control loop settings are **overwritten**, too.

Default parameters:

Default values are stored in the drive for all parameters which figure in the list **S-0-0192, IDN-list of backup operation data**. They define a **basic state** of the drive that permits the drive to be switched "ready for operation" (display "bb“). Mechanical components like gear and load as well as the control loop settings therefore are not taken into consideration.

See also the functional description: "Basic parameter block".

C800 - Attributes

H1 Display : C8

Diag. mess.:
DE C800 Default-Parameter laden
EN C800 Default parameter load
FR C800 Chargement des paramètres par défaut
ES C800 Cargar parámetros iniciales
IT C800 Caricamento Parametri di Default

Mess. no.: C800 (hex)

C801 Parameter default value erroneous (-> S-0-0021)

Cause:

During the execution of **P-0-4094, C800 Command Base-parameter load,** a default value that has been stored in the drive was recognized as incorrect. The related parameter is entered in the **S-0-0021, IDN-list of invalid op. data for comm. Ph. 2**.

See also the functional description: "Basic parameter block"

C801 - Attributes

H1 Display : C8/01

Diag. mess.:
DE C801 Parameter-Defaultwert fehlerhaft (-> S-0-0021)
EN C801 Parameter default value erroneous (-> S-0-0021)
FR C801 Valeur de défaut pour paramètre faux (voir S-0-0021)
ES C801 Valor inicial para parámetro falso
IT C801 Parametro di Default falso (-> S-0-0021)

Mess. no.: C801 (hex)

Class: Command

C802 Locked with password

The parameter **S-0-0267, Password** offers the possibility to set a **write protection** for the drive parameters. The diagnostic message **C705 Locked with password** indicates, that the command **P-0-4094, C800 Command Base-parameter load** has been started, although the drive parameters are protected with the customer password.

See also the functional description: "Basic parameter block"

C802 - Attributes

H1 Display : C8/02

Diag. mess.:
DE C802 Verriegelt mit Passwort
EN C802 Locked with password
FR C802 Bloqué avec mot de passe
ES C802 Bloqueado con contraseña
IT C802 Bloccato con parola chiave

Mess. no.: C802 (hex)

Class: Command

C900 Position spindle command

The command **S-0-0152, C900 Position spindle command** has been activated via the applied control.

See also the functional descriprion: "Spindle positioning".

C900 - Attributes

H1 Display :		C9
Diag. mess.:	**DE**	C900 Kommando Spindel positionieren
	EN	C900 Position spindle command
	FR	C900 Commande Positionnement de broche
	ES	C900 Comando posicionar husillo
	IT	C900 Comando Posizionamento Mandrino
Mess. no.:		C900 (hex)

C902 Spindle positioning requires drive enable

Cause:

When starting the **S-0-0152, C900 Position spindle command**, the drive enable was not yet set.

Remedy:

Set the drive enable before starting the command.

C902 - Attributes

H1 Display :		C9/02
Diag. mess.:	**DE**	C902 Spindelpositionieren nur mit Reglerfreigabe möglich
	EN	C902 Spindle positioning requires drive enable
	FR	C902 Posit. de broche nécéssite RF
	ES	C902 Requiere desbloqueo regulador
	IT	C902 RF scomparso per Posizionamento Mandrino
Mess. no.:		C902 (hex)
Class:		Command

C905 Positioning with non-init. absolute encoder impossible

When using an absolute encoder as motor or spindle feedback, the command "set absolute measure" must be performed in order to set the position reference between spindle and measurement system.

Cause:

The absolute encoder used as motor or spindle feedback is not in reference with the spindle. The command S-0-0152 Drive controlled spindle positioning cannot be executed, because the measuring system doesn’t have a reference position.

Remedy:

- If an absolute encoder is not desired: switch off the absolute encoder evaluation in parameter **S-0-0277, Position feedback 1 type** or **S-0-0115, Position feedback 2 type**.
- Do the **P-0-0012, C300 Command 'Set absolute measurement'**.

See also the functional description: "Drive-Controlled Homing" and "Set Absolute Measuring".

C905 - Attributes

H1 Display : C9/05

Diag. mess.:
DE C905 Spindelpos. mit nichtinit. Absolutwertgeber unmöglich
EN C905 Positioning with non-init. absolute encoder impossible
FR C905 Posit. impossible avec codeur abs. non init.
ES C905 Posicionamiento con encoder absoluto no inic. imposible
IT C905 Posiz. Mandrino solo con Encoder ass. inizializzato

Mess. no.: C905 (hex)

Class: Command

C906 Error during search for zero pulse

Cause:

The homing procedure within the spindle positioning has not been executed successfully. The encoder zero pulse has not been found or could not be assigned properly.

Remedy:

- Check the parametrization of spindle positioning, especially the used combination of encoder and reference (home) switch.
- Check the encoder parametrization.
- Check the distance between zero pulse and reference switch.
- Do the drive controlled homing to check the homing procedure.

C906 - Attributes

H1 Display : C9/06

Diag. mess.:
DE C906 Fehler Nullimpuls-Erfassung
EN C906 Error during search for zero pulse
FR C906 Erreur en cherchant l'origine
ES C906 Error durante búsqueda de punto cero
IT C906 Errore nel Azzeramento

Mess. no.: C906 (hex)

Class: Command

D100 Switch parameter set command

Via the connected control, the command **S-0-0216, D100 Switch parameter set command** has been activated.

See also the functional description: "Switching the Parameter Set".

D100 - Attributes

H1 Display : d1

Diag. mess.:
DE D100 Kommando Parametersatz umschalten
EN D100 Switch parameter set command
FR D100 Commande changement du jeu de paramètres
ES D100 Comando conmutar bloque de parámetro
IT D100 Comando cambiare Parametri

Mess. no.: D100 (hex)

D101 Offset speed of oscillation cannot be achieved

Cause:

After initiating the gear stage change with the command **D100 Switch parameter set command (S-0-0216)**, the spindle turns at the **Oscillation offset speed (S-0-0214)**. However, it does not reach the internal accknowledge of the oscillation offset speed, because the value in parameter **S-X-0157, Velocity window** is zero!

Remedy:

Set the value in parameter **S-X-0157, Velocity window** greater than zero!

If the spindle does not turn at **S-0-0214, Oscillation offset speed**:

Check whether the gear stage to be inserted is blocked!

See also the functional description: "Changing Gears".

D101 - Attributes

H1 Display :		d1/01
Diag. mess.:	**DE**	D101 Pendel-Offsetdrehzahl nicht erreichbar
	EN	D101 Offset speed of oscillation cannot be achieved
	FR	D101 Vitesse offset d'oscillation impossible
	ES	D101 Velocidad de oscilación no alcanzable
	IT	D101 Velocità per Oscillazione non possibile
Mess. no.:		D101 (hex)
Class:		Command

D200 Drive-controlled oscillation command

Via the connected control, the command **S-0-0190, D200 Drive-controlled oscillation command** has been activated.

See also the functional description: "Drive controlled Oscillation".

D200 - Attributes

H1 Display :		d2
Diag. mess.:	**DE**	D200 Kommando Antriebsgeführtes Pendeln
	EN	D200 Drive-controlled oscillation command
	FR	D200 Commande Oscillation contr. par l'entraînement
	ES	D200 Comando Oscilación controlada por accionamiento
	IT	D200 Comando Oscillazione controllato del Azionamento
Mess. no.:		D200 (hex)

D201 Oscillating drive requires drive enable

Cause:

Drive enable signal had not been set at the start of **S-0-0190, D200 Drive-controlled oscillation command.**

Remedy:

Set drive enable signal prior to start command.

see also the functional description: "Drive-Controlled Oscillating"

D201 - Attributes

H1 Display : d2/01

Diag. mess.:
DE D201 Pendeln nur mit Reglerfreigabe möglich
EN D201 Oscillating drive requires drive enable
FR D201 Oscillation nécéssite RF
ES D201 Falta desbloqueo regulador durante oscilación accion.
IT D201 RF scomparso durante Oscillazione

Mess. no.: D201 (hex)

Class: Command

D202 Offset speed of oscillation cannot be achieved

Cause:

The spindle turns with **S-0-0214, Oscillation offset speed**, but does not achieve internal acknowledgement of the offset oscillation speed, however, as the value in parameter **S-X-0157, Velocity window** is zero!

Remedy:

Set value in parameter **S-X-0157, Velocity window** to greater than zero!

See also the functional description: "Drive-Controlled Oscillating"

D202 - Attributes

H1 Display : d2/02

Diag. mess.:
DE D202 Pendel-Offsetdrehzahl nicht erreichbar
EN D202 Offset speed of oscillation cannot be achieved
FR D202 Vitesse offset d'oscillation impossible
ES D202 Velocidad de oscilación no alcanzable
IT D202 Velocità per Oscillazione non possibile

Mess. no.: D202 (hex)

Class: Command

D300 Command adjust commutation

A correctly adjusted commutation offset is mandatory for the operation of synchronous motors. The "D3“ message indicates that the command has been activated, that is used for determining the commutation offset.

Cause:

The commutation setting command has been activated.

See also the functional description: "Determining the commutation offset"

D300 - Attributes

H1 Display : d3

Diag. mess.:
DE D300 Kommando Kommutierungseinstellung
EN D300 Command adjust commutation
FR D300 Commande Justage de commutation
ES D300 Conmutación comando
IT D300 Comando di commutazione

Mess. no.: D300 (hex)

D500 Command Get mark position

The **P-0-0014, D500 Command determine marker position** command can be used for checking the correct acquisition and position of the reference marker of an incremental measuring system. The "d5“ display shows that the command has been activated.

Cause:

The **Determine marker position** command has been activated.

See also the functional description: "Functional principle of command detect marker position"

D500 - Attributes

H1 Display : d5

Diag. mess.:
DE D500 Kommando Markerposition erfassen
EN D500 Command Get mark position
FR D500 Commande Obtenir la position du marqueur
ES D500 Comando 'Registrar posición de marcador'
IT D500 Comando prendere la Positione della Marca

Mess. no.: D500 (hex)

D501 Incremental encoder required

Cause:

The command has been started for a measuring system that does not possess real reference markers. These include measuring systems such as DSF, EnDat, SSI or resolver measuring systems.

Remedy:

Check whether the correct encoder has been selected in **S-0-0147, Homing parameter**.

Employ an encoder system with real reference markers.

See also the functional description: "Functional principle of command detect marker position"

D501 - Attributes

H1 Display : d5/01

Diag. mess.:
DE D501 Kein inkrementelles Meßsystem
EN D501 Incremental encoder required
FR D501 Un codeur incremental est nécessaire.
ES D501 Falta encoder incremental
IT D501 Encoder incrementale manca

Mess. no.: D501 (hex)

Class: Command

D600 Cancel reference point procedure command

Meaning:

The reference of the encoder that has been selected via **S-0-0147, Homing parameter** is canceled.

Cause:

The **D600 Cancel reference point procedure command** has been activated.

See also the functional description: "Drive-Controlled Homing"

D600 - Attributes

H1 Display : d6

Diag. mess.:
DE D600 Kommando Referenzbezug löschen
EN D600 Cancel reference point procedure command
FR D600 Commande Annulation de l'origine
ES D600 Comando cancelar proceso de punto de referencia
IT D600 Comando Annullazione Azzeramento

Mess. no.: D600 (hex)

D700 Parking axis command

The command permits one or more drives of a drive package to be stopped without error messages being issued to the controller and/or the power supply module. The remaining drives of the package can be handled without any restrictions.

Cause:

The **S-0-0139, D700 Command parking axis** command has been activated.

See also the functional description: "Command Parking Axis"

D700 - Attributes

H1 Display : PA

Diag. mess.:
DE D700 Kommando Parkende Achse
EN D700 Parking axis command
FR D700 Commande Axe stationnée
ES D700 Comando eje estacionado
IT D700 Comando Stazionamento Asse

Mess. no.: D700 (hex)

1.5 Status Diagnostic Messages

A002 Communication phase 2

For field bus and SERCOS devices, the control demands via the master communication "communication phase 2", or the drive has been switched to phase 2 by the command **P-0-4023, C400 Communication phase 2 transition**. Therefore, the drive is in the "parameter mode". In this mode, many parameters are editable, which can no more be edited in "communication phase 4" ("operation mode").

In this phase, usually

- for field bus and SERCOS devices, the communication parameters are transferred from the control to the drive and
- the functions Load and Save parameters ("file services“) are performed when needed.

Before switching to communication phase 3 is possible, the command **S-0-0127, C100 Communication phase 3 transition check** must be done. In this command, the drive checks e.g. the validity of the parameters needed for the communication phase 3.

After successful execution of the command, the control switches the drive to comm. phase 3 (with field bus and SERCOS devices), or the drive switches by itself to phase 3 at the end of the command.

See also the functional description: "Parametrization Mode - Operating Mode".

A002 - Attributes

H1 Display : P2

Diag. mess.:
DE A002 Kommunikationsphase 2
EN A002 Communication phase 2
FR A002 Phase de communication 2
ES A002 Fase de comunicación 2
IT A002 Fase di Comunicazione 2

Mess. no.: A002 (hex)

A002 Communication phase 2

For field bus and SERCOS devices, the control demands via the master communication "communication phase 2", or the drive has been switched to phase 2 by the command **P-0-4023, C400 Communication phase 2 transition**. Therefore, the drive is in the "parameter mode". In this mode, many parameters are editable, which can no more be edited in "communication phase 4" ("operation mode").

In this phase, usually

- for field bus and SERCOS devices, the communication parameters are transferred from the control to the drive and
- the functions Load and Save parameters ("file services“) are performed when needed.

Before switching to communication phase 3 is possible, the command **S-0-0127, C100 Communication phase 3 transition check** must be done. In this command, the drive checks e.g. the validity of the parameters needed for the communication phase 3.

After successful execution of the command, the control switches the drive to comm. phase 3 (with field bus and SERCOS devices), or the drive switches by itself to phase 3 at the end of the command.

See also the functional description: "Parametrization Mode - Operating Mode".

A002 - Attributes

H1 Display : P2

Diag. mess.:
DE A002 Kommunikationsphase 2
EN A002 Communication phase 2
FR A002 Phase de communication 2
ES A002 Fase de comunicación 2
IT A002 Fase di Comunicazione 2

Mess. no.: A002 (hex)

A003 Communication phase 3

For field bus and SERCOS devices, the control demands via the master communication "communication phase 3", or the drive has been switched to phase 3 by the command **S-0-0127, C100 Communication phase 3 transition check**. The drive is in the "restricted parameter mode". In this mode, still many parameters are editable too, which can no more be edited in "communication phase 4" ("operation mode").

Before switching to communication phase 4 is possible, the command **S-0-0128, C200 Communication phase 4 transition check** must be done. In this command, the drive checks e.g. the validity of the parameters needed for the communication phase 4 ("operation mode").

After successful execution of the command, the control switches the drive to comm. phase 4 (with field bus and SERCOS devices), or the drive switches by itself to phase 4 at the end of the command.

See also the functional description: "Parametrization Mode - Operating Mode".

A003 - Attributes

H1 Display : P3

Diag. mess.:
DE A003 Kommunikationsphase 3
EN A003 Communication phase 3
FR A003 Phase de communication 3
ES A003 Fase de comunicación 3
IT A003 Fase di Comunicazione 3

Mess. no.: A003 (hex)

A010 Drive HALT

The feature Drive-Halt (= contrary of Drive-Start) is activated by the applied control via the used interface through clearing the /Drive-Halt bit (bit 13) in the master control word or by interrupting a drive control command (i.e. drive-controlled homing).

The Drive-Halt feature is for decelerating the axis to standstill at defined **acceleration and** defined **jerk**.

In **process block mode**, the acceleration and the jerk value of the previous process block are active.

In **Jog mode** and in stepper position mode,
for **acceleration, S-0-0260**, **Positioning Acceleration** is taken, and
for jerk, **S-0-0193**, **Positioning Jerk** is taken.

In **Velocity control** and in Torque control mode, the drive is decelerated to standstill by setting the velocity command to 0 and with the max. torque.

See also the functional description: "The Functional Principle of Drive Halt".

A010 - Attributes

H1 Display : AH

Diag. mess.:
DE A010 Antrieb HALT
EN A010 Drive HALT
FR A010 Arrêt entraînement
ES A010 Accionamiento parado
IT A010 Stop Azionamento

Mess. no.: A010 (hex)

A011 Drive interlock open

Digital drive controllers are equipped with a starting lockout device that prevents an unwanted start of a servo axis. Activating the starting lockout device separates the power stage control electronics from the power stage via a relay contact.

+24 V is applied to the AS+; AS– terminals of the X3 connector.

A011 - Attributes

H1 Display : AS

Diag. mess.:
DE A011 Anlaufsperre aktiv
EN A011 Drive interlock open
FR A011 Démarrage bloqué
ES A011 Bloqueo de marcha
IT A011 Blocco Azionamento

Mess. no.: A011 (hex)

A012 Control and power sections ready for operation

The drive is supplied with **control voltage**, and the power is **switched on**. The drive is **ready** to deliver **power.**

A012 - Attributes

H1 Display : Ab

Diag. mess.:
DE A012 Steuer- und Leistungsteil betriebsbereit
EN A012 Control and power sections ready for operation
FR A012 Commande et puissance prêts à fonctionner
ES A012 Secciones de mando y potencia listas para el servicio
IT A012 Azionamento pronto

Mess. no.: A012 (hex)

A013 Ready for power on

The drive is supplied with a **control voltage**, and there are **no errors** in the drive controller.

The drive is **ready** to be turned **on with power**.

See also the functional description: "Parametrization Mode - Operating Mode".

A013 - Attributes

H1 Display : bb

Diag. mess.:
DE A013 Bereit zur Leistungszuschaltung
EN A013 Ready for power on
FR A013 Prêt pour mise sous puissance
ES A013 Listo para conexión de potencia
IT A013 Sistema pronto per Inserzione Potenza

Mess. no.: A013 (hex)

A100 Drive in TORQUE control

The drive is in the torque control operating mode. It follows the torque command value sequence which was set by the control system.

See also the functional description: "Operating Mode: Torque Control".

A100 - Attributes

H1 Display : AF

Diag. mess.:
DE A100 Antrieb in Momentenregelung
EN A100 Drive in TORQUE control
FR A100 Entraînement en asservissement de COUPLE
ES A100 Accionamiento en regulación de PAR
IT A100 Azionamento in Regolazione di COPPIA

Mess. no.: A100 (hex)

A101 Drive in VELOCITY control

The drive is in the velocity control operating mode. It follows the velocity command value sequence set by the control system. The velocity control loop is closed in the drive.

See also the functional description: "Mode: Velocity Control".

A101 - Attributes

H1 Display : AF

Diag. mess.:
DE A101 Antrieb in Geschwindigkeitsregelung
EN A101 Drive in VELOCITY control
FR A101 Entraînement en asservissement de VITESSE
ES A101 Accionamiento en regulación de VELOCIDAD
IT A101 Azionamento in Regolazione di VELOCITA

Mess. no.: A101 (hex)

A106 Drive controlled interpolation, encoder 1

The drive receives a position command value from the control system which is identical to the **target position** of the travel path. Then the drive generates (**interpolates**) an internal position command value sequence, which uses the control system to maintain maximum values for jerk, velocity and acceleration sequences.

The drive moves with a systematical **lag** (following error) to the target position.

Encoder 1 indicates that the position encoder is installed on the motor shaft (indirect measurement of the axis position).

See also the functional description: "Mode: Drive Internal Interpolation".

A106 - Attributes

H1 Display : AF

Diag. mess.:
DE A106 Antriebsinterne Interpolation, Geber 1
EN A106 Drive controlled interpolation, encoder 1
FR A106 Interpolation interne, codeur 1
ES A106 Interpolación contr. por accionamiento, encoder 1
IT A106 Azionamento contr. in Interpolazione, Encoder 1

Mess. no.: A106 (hex)

A107 Drive controlled interpolation, encoder 2

The drive receives a position command value from the control system which is identical to the **target position** of the travel path. Then the drive generates (**interpolates**) an internal position command value sequence, which uses the control system to maintain maximum values for jerk, velocity and acceleration sequences.

The drive moves with a systematical **lag** (following error) to the target position.

Encoder 2 indicates that the position encoder is installed on the machine axis (direct axis position measurement).

See also the functional description: "Mode: Drive Internal Interpolation"

A107 - Attributes

H1 Display : AF

Diag. mess.:
DE A107 Antriebsinterne Interpolation, Geber 2
EN A107 Drive controlled interpolation, encoder 2
FR A107 Interpolation interne, codeur 2
ES A107 Interpolación contr. por accionamiento, encoder 2
IT A107 Azionamento contr. in Interpolazione, Encoder 2

Mess. no.: A107 (hex)

A108 Drive controlled interpolation, lagless, encoder 1

The drive receives a position command value from the control system which is identical to the **target position** of the travel path. Then the drive generates (**interpolates**) an internal position command value sequence, which uses the control system to maintain maximum values for jerk, velocity and acceleration sequences.

The drive moves **without following error** to the target position.

Encoder 1 indicates that the position encoder is installed on the motor shaft (indirect measurement of the axis position).

See also the functional description: "Mode: Drive Internal Interpolation".

A108 - Attributes

H1 Display : AF

Diag. mess.:
DE A108 Antriebsinterne Interpol. schleppfrei, Geber 1
EN A108 Drive controlled interpolation, lagless, encoder 1
FR A108 Interpolation interne, codeur 1, sans erreur poursuite
ES A108 Interpol. por accion. int., enc. 1, sin retardo
IT A108 Azionamento contr. in Interp., Enc. 1, senza E.I.

Mess. no.: A108 (hex)

A109 Drive controlled interpolation, lagless, encoder 2

The drive receives a position command value from the control system which is identical to the **target position** of the travel path. Then the drive generates (**interpolates**) an internal position command value sequence, which uses the control system to maintain maximum values for jerk, velocity and acceleration sequences.

The drive moves **without following error** to the target position.

Encoder 2 indicates that the position encoder is installed on the machine axis (direct axis position measurement).

See also the functional description: "Mode: Drive Internal Interpolation".

A109 - Attributes

H1 Display : AF

Diag. mess.:
DE A109 Antriebsinterne Interpol. schleppfrei, Geber 2
EN A109 Drive controlled interpolation, lagless, encoder 2
FR A109 Interpolation interne, codeur 2, sans erreur poursuite
ES A109 Interpol. por accion. int., enc. 2, sin retardo
IT A109 Azionamento contr. in Interp., Enc. 2, senza E.I.

Mess. no.: A109 (hex)

A146 Relative drive controlled interpolation, encoder 1

In the **S-0-0282, Travel distance** parameter, the drive receives a distance specification from the controller. When bit 0 of the **S-0-0346, Setup flag for relative command values** parameter is toggled, this distance is summed up to the value in **S-0-0258, Target position**. In order to get from the current position to the new target position, the drive now generates (interpolates) an internal position command value curve. This is done taking the limit values of velocity, acceleration, and jerk in the parameters

- **S-0-0259, Positioning velocity**
- **S-0-0260**, **Positioning acceleration**
- **S-0-0193, Positioning jerk**

into account.

The drive approaches the target position with a position lag that is proportional to the velocity.

Encoder 1 means that the position encoder is attached to the motor shaft (indirect measurement of the axis position).

See also the functional description: "Mode: Relative drive-internal interpolation".

A146 - Attributes

H1 Display : AF

Diag. mess.: **DE** A146 Relative antriebsinterne Interpolation, Geber 1
EN A146 Relative drive controlled interpolation, encoder 1
FR A146 Interpolation interne relative, codeur 1
ES A146 Interpol. relativa contr. por accion., enc. 1
IT A146 Azionam. contr. in Interp. relativa, Enc. 1

Mess. no.: A146 (hex)

A147 Relative drive controlled interpolation, encoder 2

In the **S-0-0282, Travel distance** parameter, the drive receives a distance specification from the controller. When bit 0 of the **S-0-0346, Setup flag for relative command values** parameter is toggled, this distance is summed up to the value in **S-0-0258, Target position**. In order to get from the current position to the new target position, the drive now generates (interpolates) an internal position command value curve. This is done taking the limit values of velocity, acceleration, and jerk in the parameters

- **S-0-0259, Positioning velocity**
- **S-0-0260**, **Positioning acceleration**
- **S-0-0193, Positioning jerk**

into account.

The drive approaches the target position with a position lag that is proportional to the velocity.

Encoder 2 means that the position encoder that is attached to the load is used for closing the position control loop (direct axis position measurement).

See also the functional description: "Mode: Relative drive-internal interpolation".

A147 - Attributes

H1 Display : AF

Diag. mess.:
DE A147 Relative antriebsinterne Interpolation, Geber 2
EN A147 Relative drive controlled interpolation, encoder 2
FR A147 Interpolation interne relative, codeur 2
ES A147 Interpol. relativa contr. por accion., enc. 2
IT A147 Azionam. contr. in Interp. relativa, Enc. 2

Mess. no.: A147 (hex)

A148 Relative drive contr. interpolation, enc. 1, lagless

In the **S-0-0282, Travel distance** parameter, the drive receives a distance specification from the controller. When bit 0 of the **S-0-0346, Setup flag for relative command values** parameter is toggled, this distance is summed up to the value in **S-0-0258, Target position**. In order to get from the current position to the new target position, the drive now generates (interpolates) an internal position command value curve. This is done taking the limit values of velocity, acceleration, and jerk in the parameters

- **S-0-0259, Positioning velocity**
- **S-0-0260**, **Positioning acceleration**
- **S-0-0193, Positioning jerk**

into account.

The drive approaches the target position of the travel path without a position lag.

Encoder 1 means that the position encoder is attached to the motor shaft (indirect measurement of the axis position).

See also the functional description: "Mode: Relative drive-internal interpolation".

A148 - Attributes

H1 Display : AF

Diag. mess.:
DE A148 Relative antriebsint. Interpol. Geber 1, schleppfrei
EN A148 Relative drive contr. interpolation, enc. 1, lagless
FR A148 Interpol. interne relative, cod. 1, sans err. pste.
ES A148 Interpol. rel. por accion. int., enc. 1, sin retardo
IT A148 Azionam. contr. in Interp. relat., Enc. 1, senza E.I.

Mess. no.: A148 (hex)

A149 Relative drive contr. interpolation, enc. 2, lagless

In the **S-0-0282, Travel distance** parameter, the drive receives a distance specification from the controller. When bit 0 of the **S-0-0346, Setup flag for relative command values** parameter is toggled, this distance is summed up to the value in **S-0-0258, Target position**. In order to get from the current position to the new target position, the drive now generates (interpolates) an internal position command value curve. This is done taking the limit values of velocity, acceleration, and jerk in the parameters

- **S-0-0259, Positioning velocity**
- **S-0-0260**, **Positioning acceleration**
- **S-0-0193, Positioning jerk**

into account.

The drive approaches the target position of the travel path without a position lag.

Encoder 2 means that the position encoder that is attached to the load is used for closing the position control loop (direct axis position measurement).

See also the functional description: "Mode: Relative drive-internal interpolation".

A149 - Attributes

H1 Display : AF

Diag. mess.:
DE A149 Relative antriebsint. Interpol. Geber 2, schleppfrei
EN A149 Relative drive contr. interpolation, enc. 2, lagless
FR A149 Interpol. interne relative, cod. 1, sans err. pste.
ES A149 Interpol. rel. por accion. int., enc. 2, sin retardo
IT A149 Azionam. contr. in Interp. relat., Enc. 2, senza E.I.

Mess. no.: A149 (hex)

A800 Unknown operation mode

There is no diagnosis for the activated operation mode.

A800 - Attributes

H1 Display : AF

Diag. mess.:
DE A800 Unbekannte Betriebsart
EN A800 Unknown operation mode
FR A800 Mode de fonctionnement inconnu
ES A800 Modo de operación desconocido
IT A800 Modo operativo non conosciuto

Mess. no.: A800 (hex)

1.6 Diagnostic messages for basic initialization and after fatal System errors

Diagnostic Message Display: -0

Cause:

The data storage for the controller is tested for its functional capability.

If an error is detected, this display will remain.

Remedy:

The drive controller is defective (DRP3) and must be exchanged.

Analog nicht: Diagnostic Message Display: -1

Cause:

The data storage for the DSS 2.1 Module is tested for its functional capability.

If an error is detected, this display will remain.

Remedy:

The DSS Module or the connection to the main device is defective.

- If DSS module is defective > exchange
- If drive controller is defective > exchange

Diagnostic Message Display: -2

Cause:

Makeup of the parameter structure.

If the EPROMS are exchanged for another version of the firmware, the parameter memory on the programming module is erased (duration appx. 5 sec.).

Diagnostic Message Display: -3

Cause:

The motor type and the type of the motor feedback are determined by reading their parameter storage areas.

Diagnostic Message Display: -5

During basic initialization, an error was reported by the coprocessor.

Cause:

1. Control voltage error (+24 V or +/-15 V).
2. +/-10 V - error.

Remedy:

For 1. Check the control voltage supply.

For 2. Replace the drive.

Diagnostic Message Display: -6

Cause:

A fatal processor or program error was encountered.

Remedy:

The error in question is a system error. Please contact the appropriate software development company.

Diagnostic Message Display: Watchdog

Cause:

A fatal processor or program error (Watchdog) was encountered.

Remedy:

Replace the drive.

1.7 Operation Status

bb

"read for operation"

The drive is ready to be turned on.

Diagnostic message text:

Ready to be turned on (ready for operation)

Ab

"Drive is ready"

The control and power components of the drive are ready for operation.

Diagnostic message text:

Control and power components are ready (drive is ready)

AF

"Drive enable"

The drive enable was issued and operated the activation of the drive. This follows a command value input.

Diagnostic message text:

according to selected operating mode.

AS

"Drive interlock"

The power output was locked. This signal serves the secured torque free switching of the drive independent from existing operating states of the drive packs.

Diagnostic message text:

Drive interlock

AH

"Drive Halt"

The drive will be stopped under the conditions of the acceleration parameter and stays in control.

P0

Phase 0

The drive is in phase 0 and is waiting on the phase transition from phase 0 to phase 1.

Diagnostic message text:

Phase 0

P1

Phase 1

The transition from phase 1 to phase 2 was still not initiated from the control system.

Remedy:

see the control handbook

P2

Phase 2

Before the control system switches in the communications phase 3, the controller checks inputted parameters for content of the input limits and for completeness. If invalid parameter values were found, the phase progression switch will stop the drive.

Note: The parameters are not checked for exactness.

Remedy:

In the parameter "Identification Number List Invalid Operating Data Communications Phase 2", the ID numbers S-0-0021 are recorded which were recognized as invalid from the drive before the phase progression switch in communications phase 3. The completion of this parameter is required in order for switching into communications phase 3.

P3

Phase 3

Before the control system switches in the communications phase 4, the controller checks inputted parameters for content of the input limits and for completeness. If invalid parameter values are recognized, the phase progression switch will be stopped by the controller.

Note: The parameters are not checked for exactness.

Remedy:

In the parameter "ID Number Lists of Invalid Operating Data Communications Phase 3", ID number S-0-0022 records the parameters which were recognized as invalid by the drive before the phase progression switch in communications phase 4. The completion of this parameter is required in order for switching into communications phase 4.

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DIAX04
Drive With Main Spindle Function,
Analog- and Parallelinterface

Supplement C
Serial Communications
AHS 03VRS

DOK-DIAX04-AHS-03VRS**-FK01-EN-P

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Notes

1 Serial Communications

1.1 Overview

The drive controller is equipped with a serial interface. It supports the parametrization of the drive. Using the interface, it is possible to alter

- **Parameters**
- **Commands and**
- **Diagnoses**

Interface mode

The interface can be operated in either

- **RS232 mode** or
- **RS485 mode**

Interface protocol

The **ASCII protocol** is supported.

1.2 Pertinent Parameters

The data exchange which implements the serial interface is controlled by means of the following parameters:

- **P-0-4021, Baud rate RS-232/485**
- **P-0-4022, Drive address**
- **P-0-4050, Delay answer RS-232/485**

1.3 Function Principle

Basic State once the Control Voltage is Switched On

After the control voltage is switched on, serial communications in the drive is in "**Passive mode**". Communications is not possible in passive mode.

To be able to take up serial communications with the drive it is necessary to set the communications mode (protocol)

- with a "**Change Drive" command** (with **ASCII protocol**)

Setting the Drive Address

The drive address is set via the serial interface by write accessing communications parameter **P-0-4022, Drive address.** DriveTop or a PLC can be used for this purpose.

RS485 mode

It is only absolutely necessary to set the drive address if communications uses the **RS485 bus** because each bus participant will be addressed at a specific bus address.

Note: To avoid accessing conflicts, assign each drive address only once.

RS232 mode

This mode does not necessitate the setting of drive address because only one participant is connected (peer-to-peer connection).

Communications via RS232 Interface

The RS232 interface is especially intended for use when connecting a PC with the **DriveTop** startup program.

Note: A maximum transmission distance of 15 meters is possible.

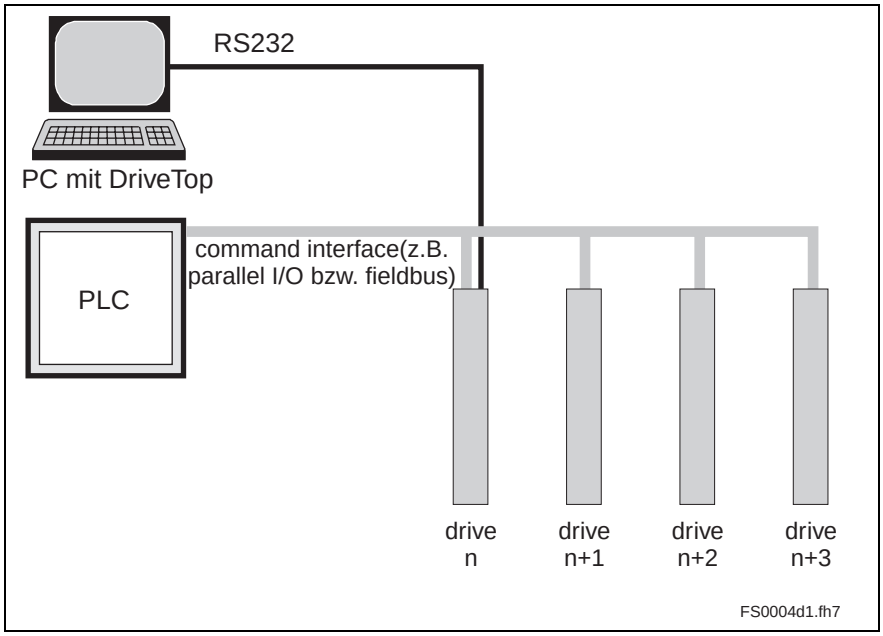


Fig. 1-1: Communications via RS-232 interface

Communications via RS485 Interface

Features

. Communications via RS485 interface helps implement a **serial bus** with the following data:

- Up to **31 drives** can be connected to one bus master.
- Transmission rates of: **9600** and **19200** baud
- Maximum transmission path: **500m**
- **Half duplex** mode over a **2-wire** line
- 8-bit **ASCII** protocol
- no **parity bit**
- one stop bit

Note: To avoid accessing conflicts, every drive address is assigned only once in RS485 mode.

Operating several Drives with DriveTop

Application advantages:

- Starting up several drives without replugging an interface cable (central parametrization and diagnostics connection).
- Implementing a central PC-supported visualization unit.

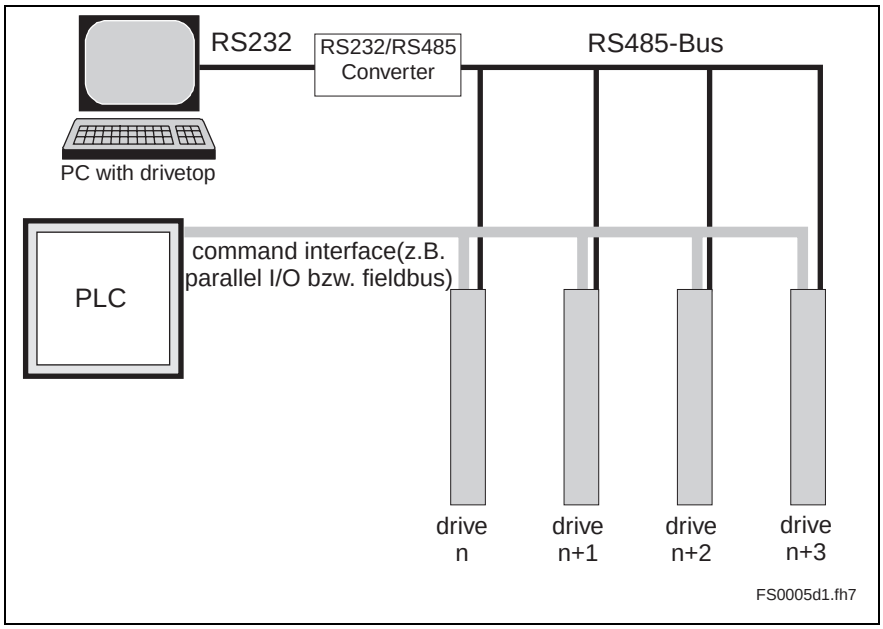


Fig. 1-2: Operating several drives with DRIVETOP

Parametrization and Diagnosing with a PLC

Application advantages:

- Parameters can be changed with a PLC (e.g., adjusting positioning blocks).
- Expanded diagnostics options for the PLC by reading in error code.

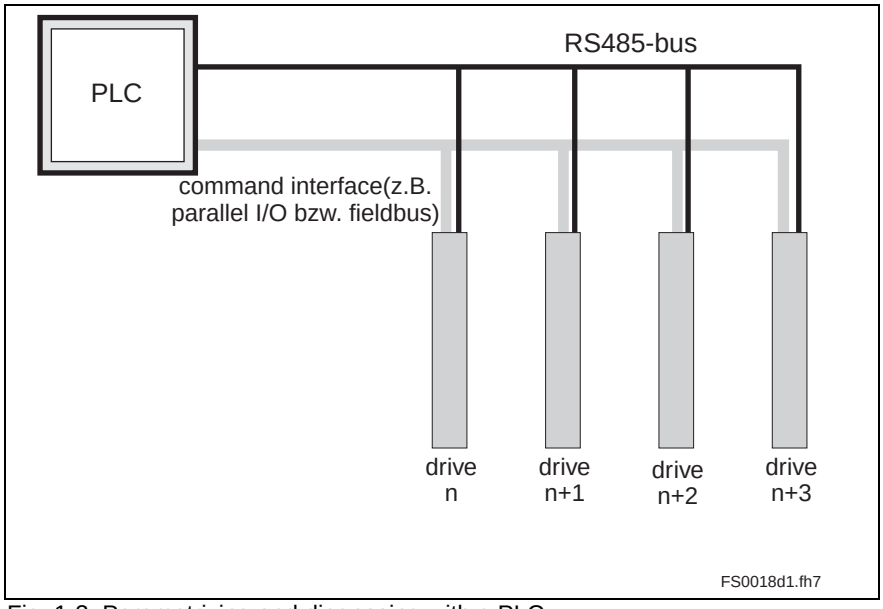


Fig. 1-3: Parametrizing and diagnosing with a PLC

Parametrization and Diagnosing Drive Groups Using a Control Unit

Application advantages:

- Using a central visualization unit.

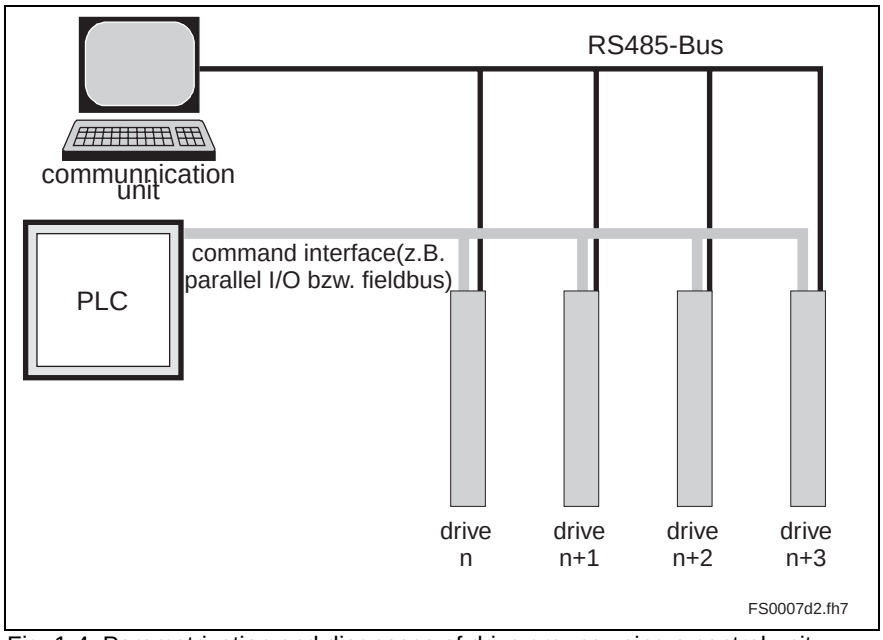


Fig. 1-4: Parametrization and diagnoses of drive groups using a control unit

1.4 Transmission Protocols

ASCII Protocol

Properties:

- Transmission speeds: 9600 and 19200 baud
- max. transmission distance: 15 meters
- 8 bit **ASCII protocol**
- no parity
- one stop bit

Structure, Telegram frame:

In this case, **no telegram frame** is used, but instead the transmitted ASCII symbol is converted and interpreted. It is only necessary to maintain a specified order.

1.5 Communications procedures

General Information on the Parameter Structure

All parameters of the drive controller are stored in a uniform parameter structure. Each parameter is made up of 7 elements. The table below describes the individual elements and access possibilities. The parameter structures illustrated here will be referenced in the following sections.

Element no.	Data block element	Access posibilities
1	ID number	read
2	name	read
3	attribute	read
4	unit	read
5	min. input value	read
6	max. input value	read
7	operating data	read / write

Fig. 1-5: Parameter structure

Note: Attached is a parameter description with detailed data of the features of all available parameters.

Communicating with an ASCII Protocol

Actuating a Specific Bus User

To communicate with a bus user then it must be directly addressed with a CHANGE DRIVE command, specifying the drive address. With each CD command, the drive specified by the address is addressed. All other drives are switched into passive mode. The addressed drive signals with a prompt. As of this point, all further communication takes place with this drive until another CHANGE DRIVE command switches to another drive.

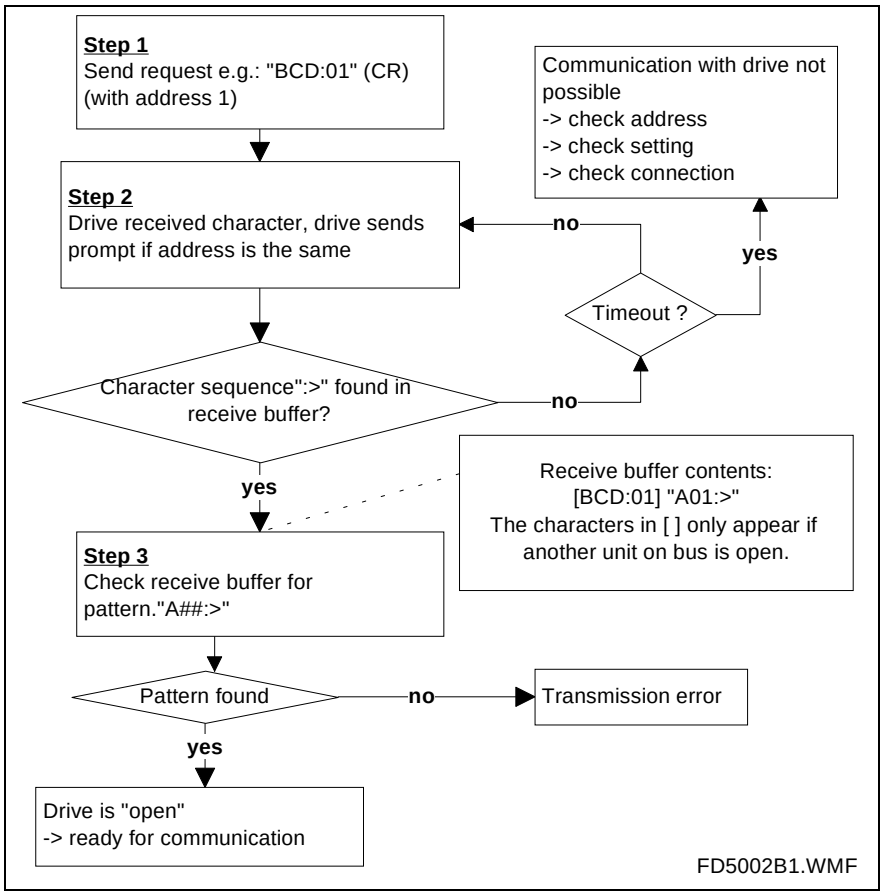


Fig. 1-6: Actuating a bus user

Note: After execution of the command **P-0-4094, C800 Basic load**, the drive address (P-0-4022) is overwritten with 1 for all drives.

Example:

During the setup, you wish to communicate with a drive.

After executing the command **P-0-4094, C800 Basic load**, all the drives have the address 1.

Now you connect the first drive with the PC for setup and send the request for drive 1 (**bcd:01**), or you start the program *DriveTop*. The connected drive responds with its prompt (**D01:>**).

By writing to the parameter P-0-4022, Drive address, you set the desired address (e.g. P-0-4022,7,w,5). This is only possible in phase 2.

The drive responds with the prompt **D05:>** .

In this way, you set for each of your drives its own drive address.

Note: Only when all connected drives have different addresses, a serial communication with an RS-485 bus system will work.

Write Accessing a Parameter

The write accessing of a parameter generally takes place as follows:

ID number of parameter, data block element number, with operating data (Carriage Return)

Once a write operation is completed, the drive signals with a prompt.

To access the parameter value of parameter P-0-4022, for example, the following must be input:

Note: All data entered must correspond to the data type set in the attribute (HEX, BIN, DEZ).

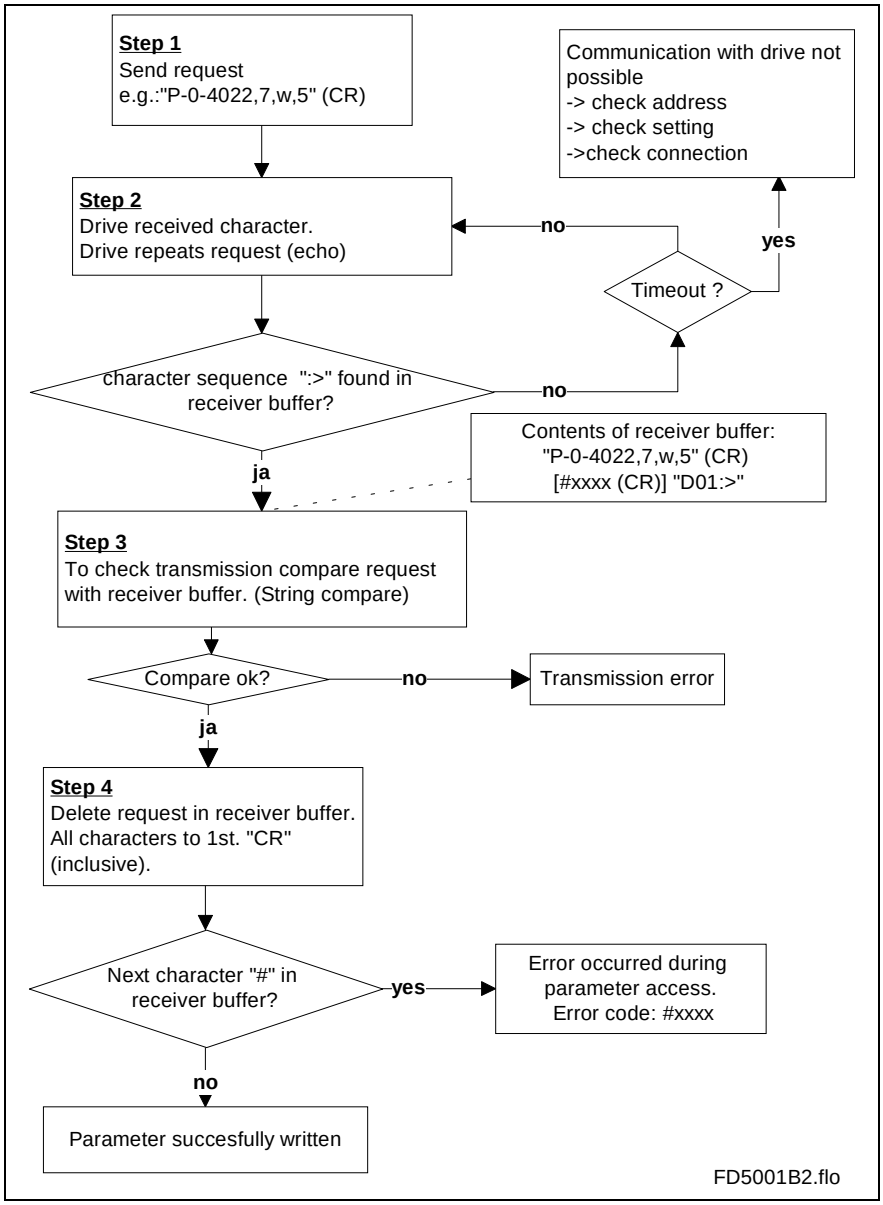


Fig. 1-7: Write accessing a parameter

Also see error messages.

Read Accessing a Parameter

Read accessing a parameter looks like this :

ID number of parameter, data block element number (Carriage Return)

The drive plays back the contents of the addressed data block element.

To access the operating data of parameter P-0-4022, for example, the following must be input:

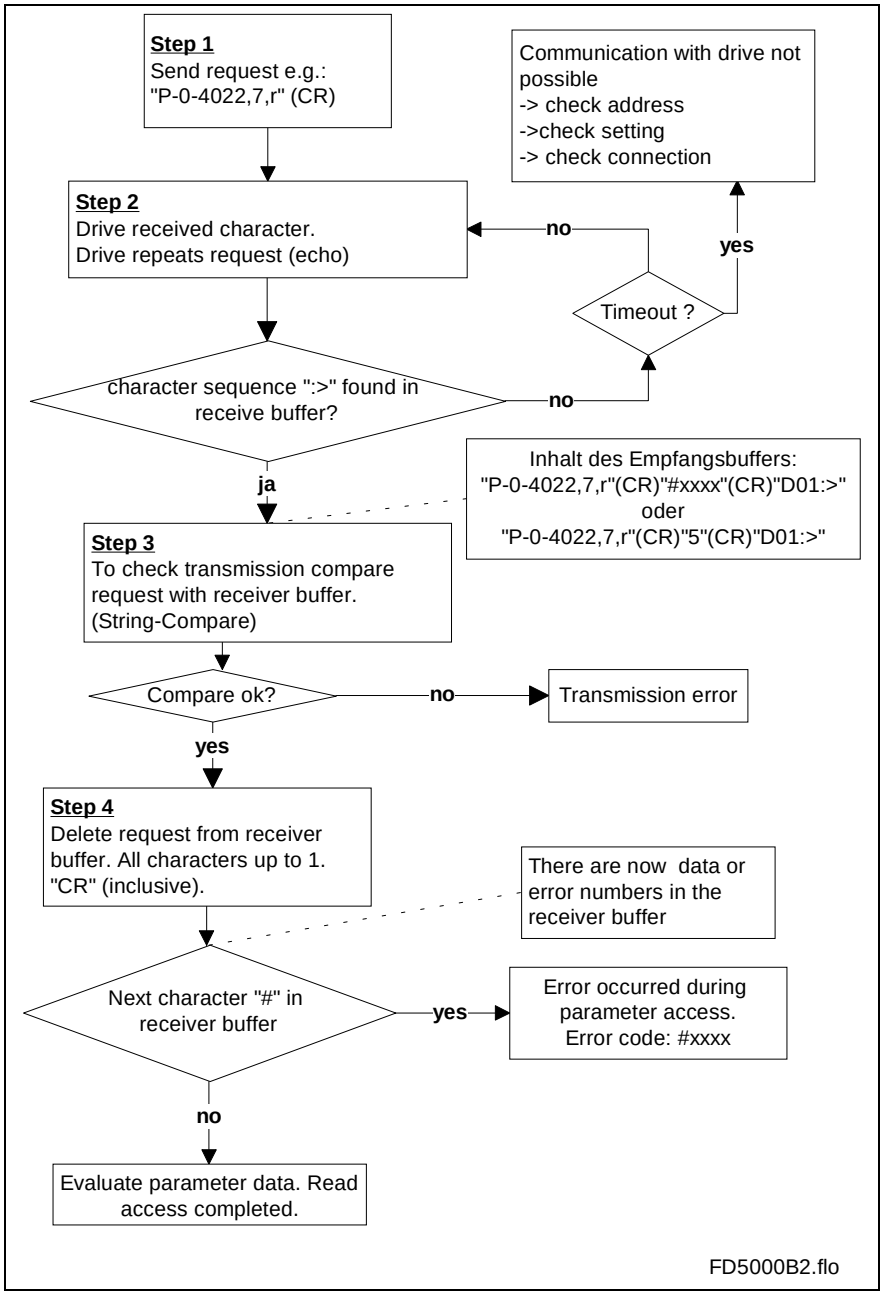


Fig. 1-8: Read accessing a parameter

Write Accessing List Parameters

There are a number of lists in the drive. These can be addressed when writing in a modified way.

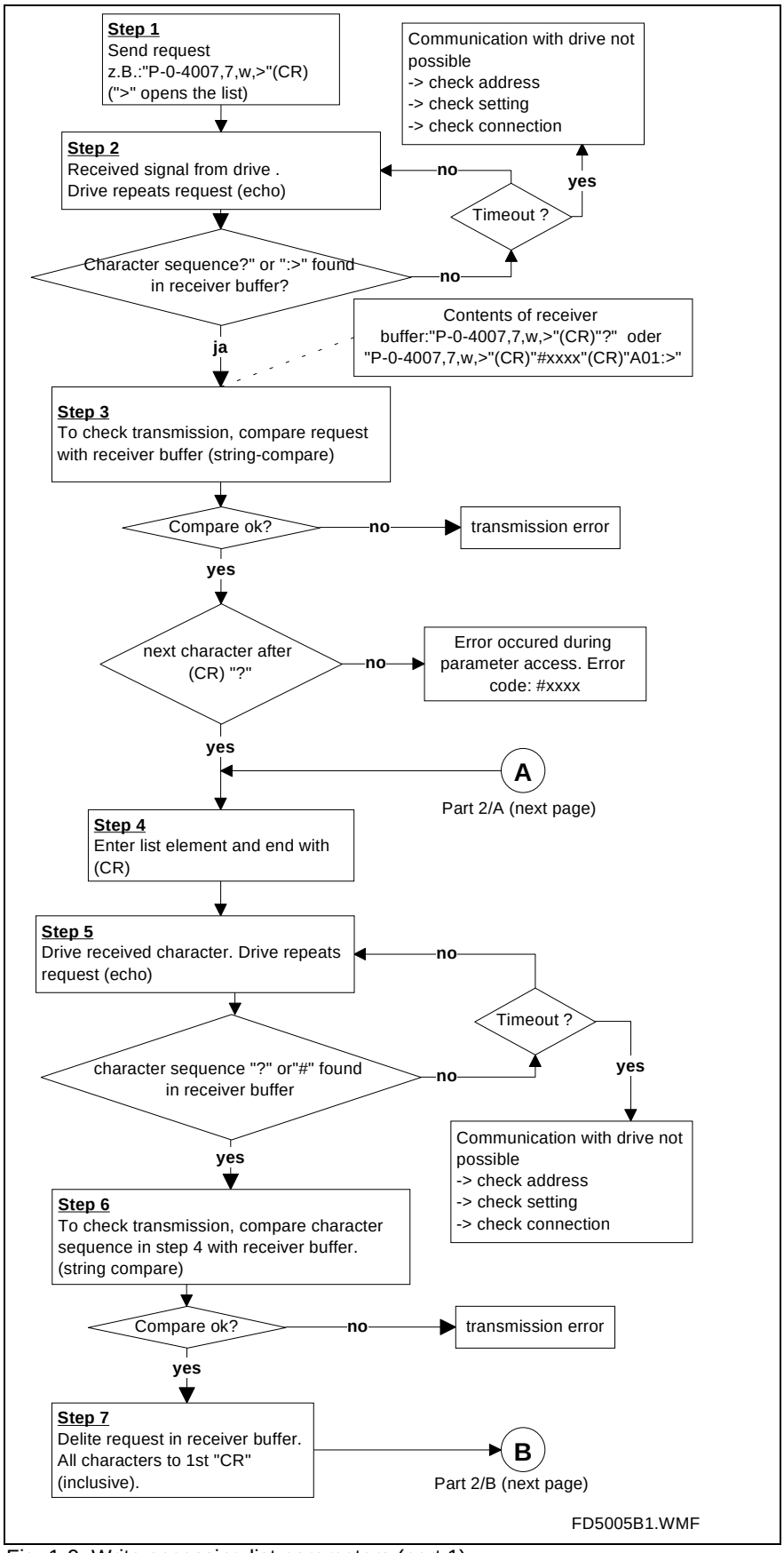


Fig. 1-9: Write accessing list parameters (part 1)

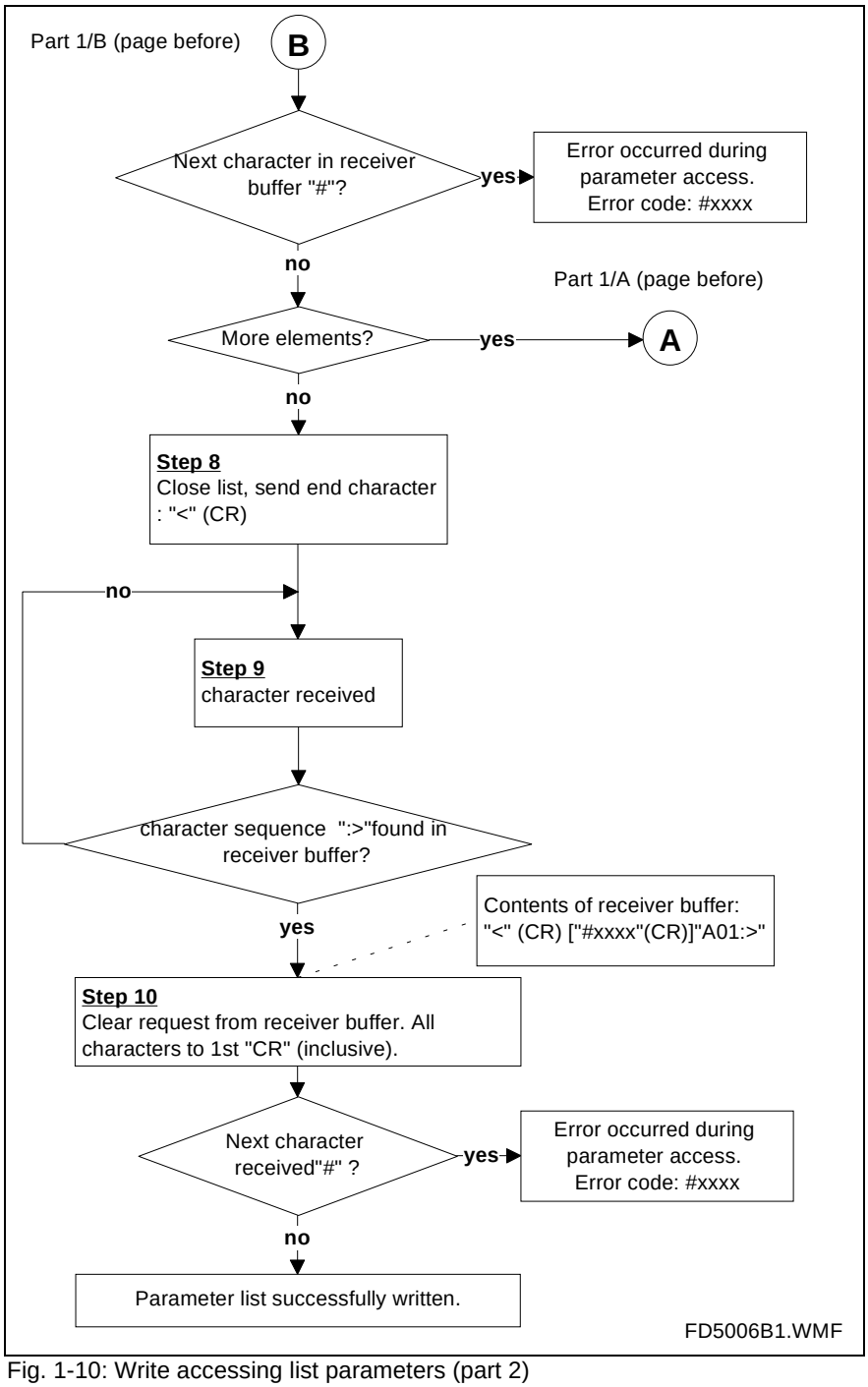


Fig. 1-10: Write accessing list parameters (part 2)

It is important to conclude the input with a "<" symbol as only then will be the data be assumed in the drive.

Reading Accessing List Parameters

List parameters are read accessed in the same way as normal parameters. The drive supplies all list elements as response, however.

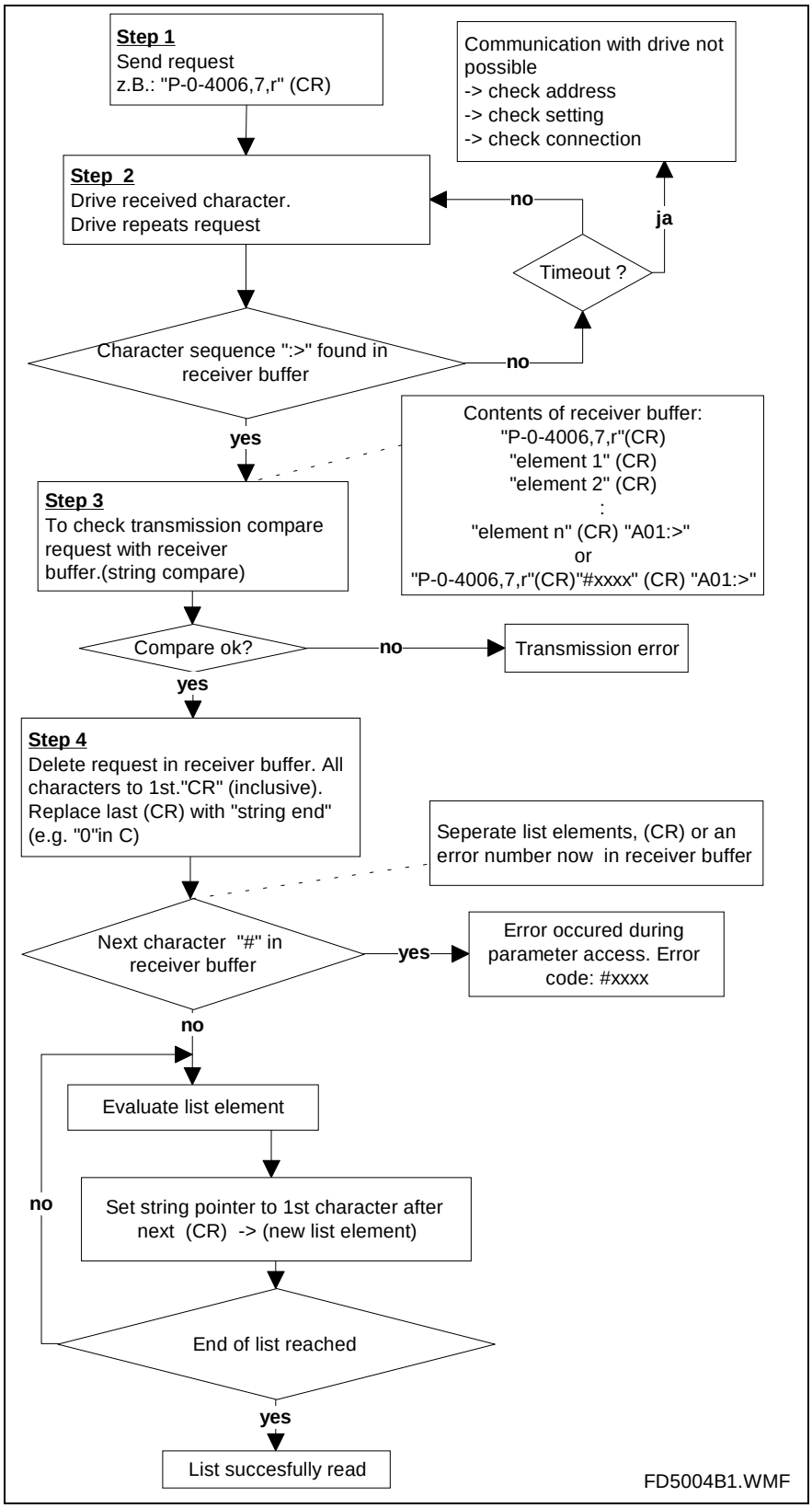


Fig. 1-11: Read accessing list parameters

Starting a Command

Numerous commands can be conducted in the drive controller . Command execution takes place automatically in the drive. There are commands for:

- **Switching between operating and parametrization modes: S-0-0127, C100 Communication phase 3 transition check S-0-0128, C200 Communication phase 4 transition check P-0-4023, C400 Communication phase 2 transition**
- **S-0-0262, C700 Command basic load**
- **S-0-0099, C500 Reset class 1 diagnostic**
- **S-0-0148, C600 Drive controlled homing procedure command**
- **P-0-0012, C300 Command Set absolute measuring**
- **S-0-0139, D700 Parking axis command**
- **S-0-0149, D400 Positive stop drive procedure command**
- **S-0-0191, D600 Cancel reference point procedure command**
- **P-0-0014, D500 Command Get mark position**
- **P-0-0524, D300 Command adjust commutation**
- **P-0-4094, C800 Default parameter load**

A command can be started, terminated and completed via the serial interface. The status of command execution can also be read.

A command is triggered as follows:

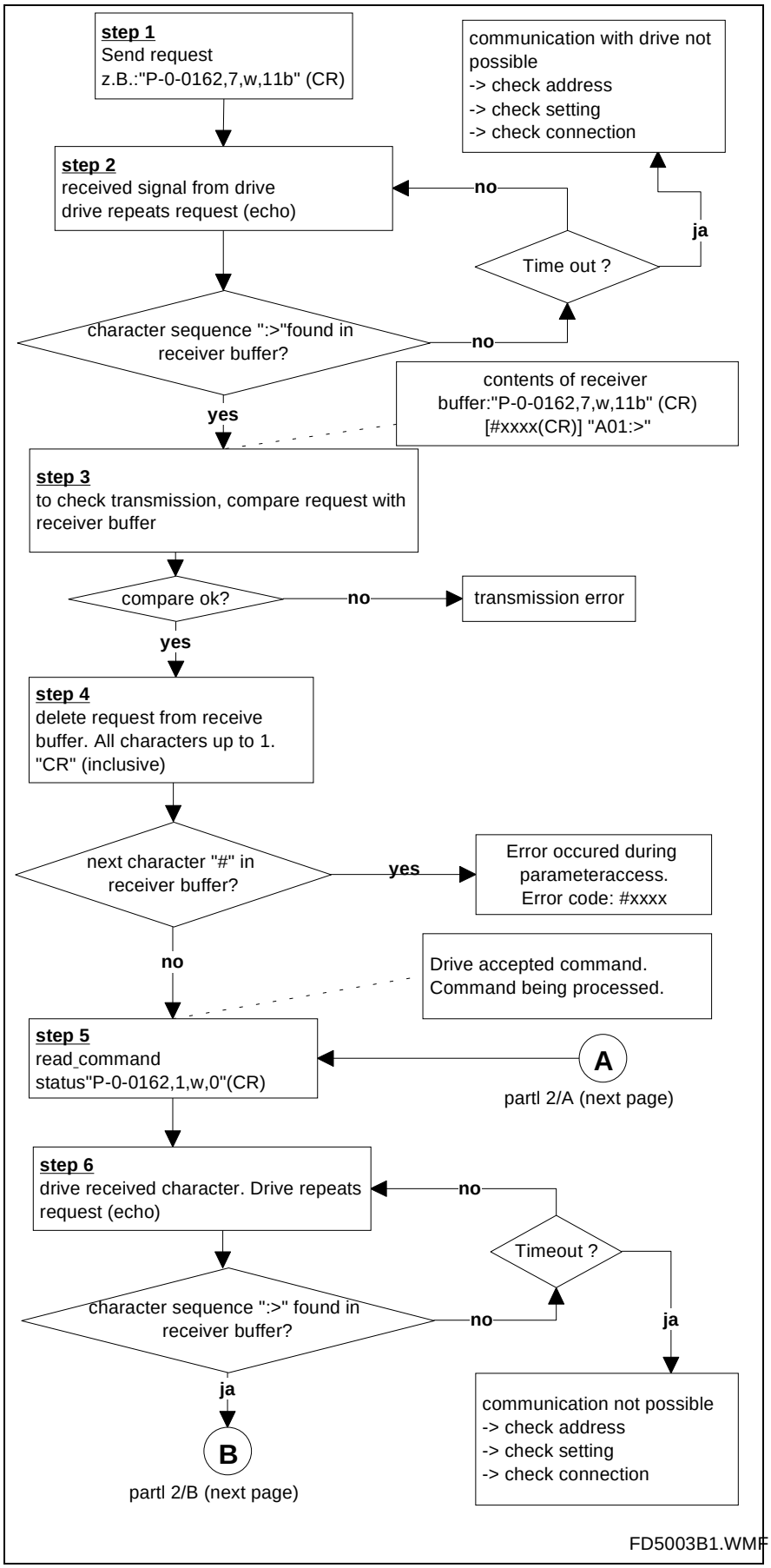


Fig. 1-12: Starting a command, part 1

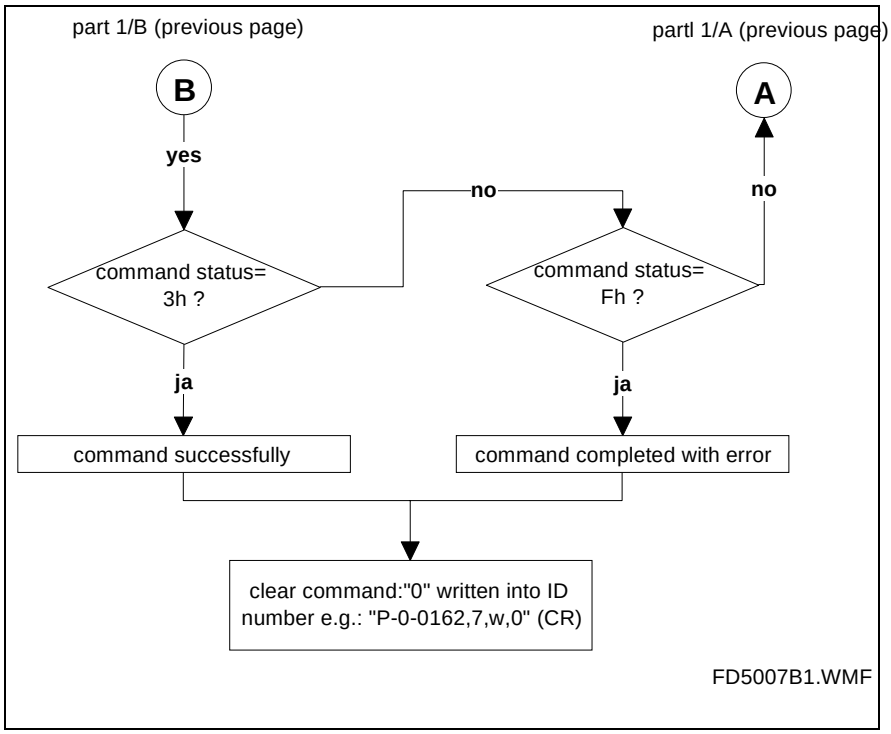


Fig. 1-13: Starting a command, part 2

Querying Command Status

The current status of a command can be queried. By doing so, it can be ascertained that the drive has concluded command execution before the control (or PC) has ended the command.

The command status is queried as follows:

ID number of command,1,w,0 (Carriage Return)

The drive signals the current command status after the ID number of the command parameter is written.

Possible status messages:

0 h	command not set in drive
1 h	command set in drive
3 h	command set, released and properly executed
5 h	command set in drive and enabled
7 h	command set and enabled, but not executed
F h	command set and enabled, but not executed, as error present

Fig. 1-14: Status messages

The command status is transmitted in bit list form. The definition of the individual bits is illustrated below.

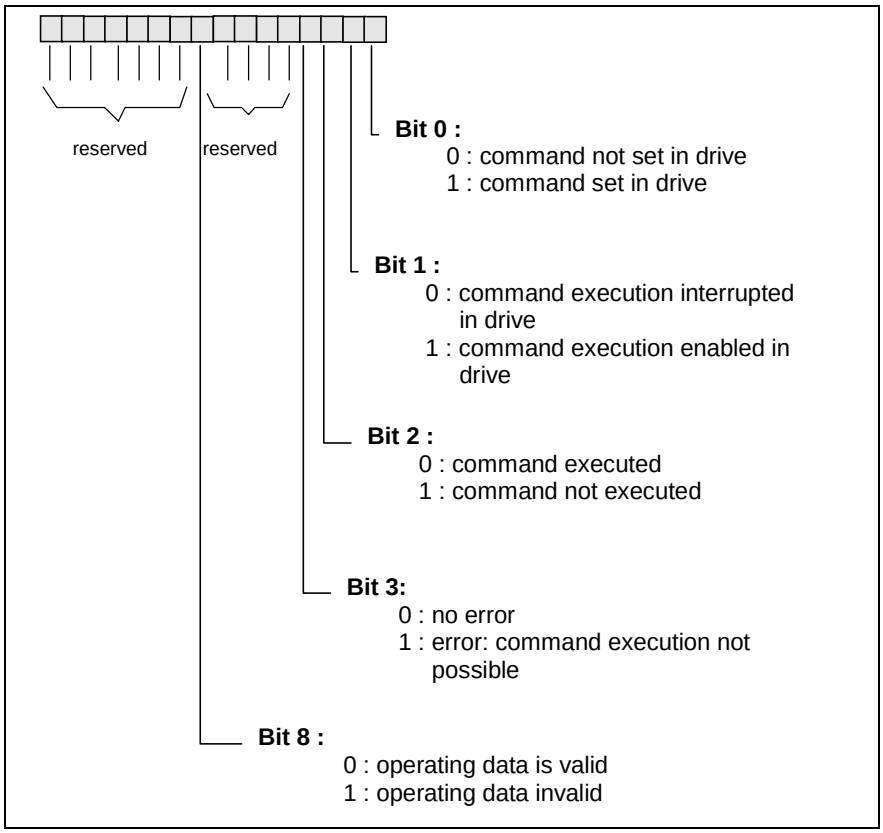

reserved
reserved
Bit 0 :
0 : command not set in drive
1 : command set in drive
Bit 1 :
0 : command execution interrupted in drive
1 : command execution enabled in drive
Bit 2 :
0 : command executed
1 : command not executed
Bit 3:
0 : no error
1 : error: command execution not possible
Bit 8 :
0 : operating data is valid
1 : operating data invalid

Fig. 1-15: Command acknowledgement (data status)

Ending a command

A command is ended as follows:

ID number of command,7,w,0 (Carriage Return)

1.6 Error Messages

The error codes defined in the SERCOS interface specification are used. (See **SERCOS Interface specification, sec. 4.3.2.3 "Error messages in service channel**"). These codes are also used with faulty accessing of control and systems parameters.

Error code	Explanation
0x1001	IDN not available
0x1009	element 1 incorrectly accessed
0x2001	name not available
0x2002	name transmission too short
0x2003	name transmission too long
0x2004	name cannot be changed
0x2005	name presently write protected
0x3002	attribute transmission too short
0x3003	attribute transmission too long
0x3004	attribute cannot be changed
0x3005	attribute presently write protected
0x4001	unit not available
0x4002	unit transmission too short
0x4003	unit transmission too long
0x4004	unit cannot be changed
0x4005	unit presently write protected
0x5001	minimum input value not available
0x5002	minimum input value transmission too short
0x5003	minimum input value transmission too long
0x5004	minimum input value cannot be changed
0x5005	minimum input value presently write protected
0x6001	maximum input value not available
0x6002	maximum input value transmission too short
0x6003	maximum input value transmission too long
0x6004	maximum input value cannot be changed
0x6005	maximum input value presently write protected
0x7002	data transmission too short
0x7003	data transmission too long
0x7004	data cannot be changed
0x7005	data presently write protected
0x7006	data semaller than minimum input value
0x7007	data greater than maximum input value
0x7008	data not correct
0x7009	data password protected

Fig. 1-16: Error specifications per SERCOS

Error with ASCII Communication

The following error messages specifically occur when communicating with an ASCII protocol!

Error code	Explanation
0x9001	fatal error (symbol cannot be identified)
0x9002	parameter type error
0x9003	invalid data block number
0x9004	"Input cannot be identified"
0x9005	data element number not defined
0x9006	error in write/read (r/w)
0x9007	nonsense symbol in data

Fig. 1-17: Error messages during ASCII communications

1.7 **Application Examples** (Changing Position Block Data)

ASCII Protocol

Suppositions:

- Several drives are connected with a PLC via an RS-485 interface. The drive's address is 1.
- Drive working in positioning mode. Four positioning blocks are used.
- The target positions of the positioning blocks are to be changed via RS-485 interface.

Taking up communications with the relevant drive

BCD:01 (CR)	Command to switch to drive **A01:>** Echo of connected drives. All other drives remain passive.

Note: There is no echo by symbol. Not until after the receipt of the CR does the drive send the entire input sequence back.

Activate non-resident storage

Generally, the parameters are stored in the EEPROM when writing so that even if the power voltage is switched off the data is retained.

If frequent parameter changes are desired during operation, for example a change of the target position of the positioning blocks, then there exists the danger that the maximum allowable number of write cycles of the EEPROM is exceeded. To avoid this, the resident storing must be switched off.

It is necessary to switch off the resident storing each time the power supply to the control is switched on. This applies until the next time the power voltage is switched off again.

Switching resident memory off: S-0-0269,7,w,1 (CR)

Write list of target positions into drive

The target positions of all axes are stored in the form of a list in parameter **P-0-4006, Process block target position**. To change one or more values in this list, it is necessary to write all relevant values of this list. If, therefore, four target positions are used, then all four positions must be written even if only one position is changed.

Drive reaction:		**Input:**
P-0-4006,7,w,> (CR)		
?	*100.0 (CR)*	target position block0
?	*200.0 (CR)*	target position block1
	etc.	
?	*<(CR)*	
A01:>		

1.8 Connection Techniques

The serial interface operation can be chosen as RS-232 or RS-485.

Connection Technique RS-232 Interface

Via the RS-232 interface, only one drive at a time can be parametrized with the setup program *DriveTop*.

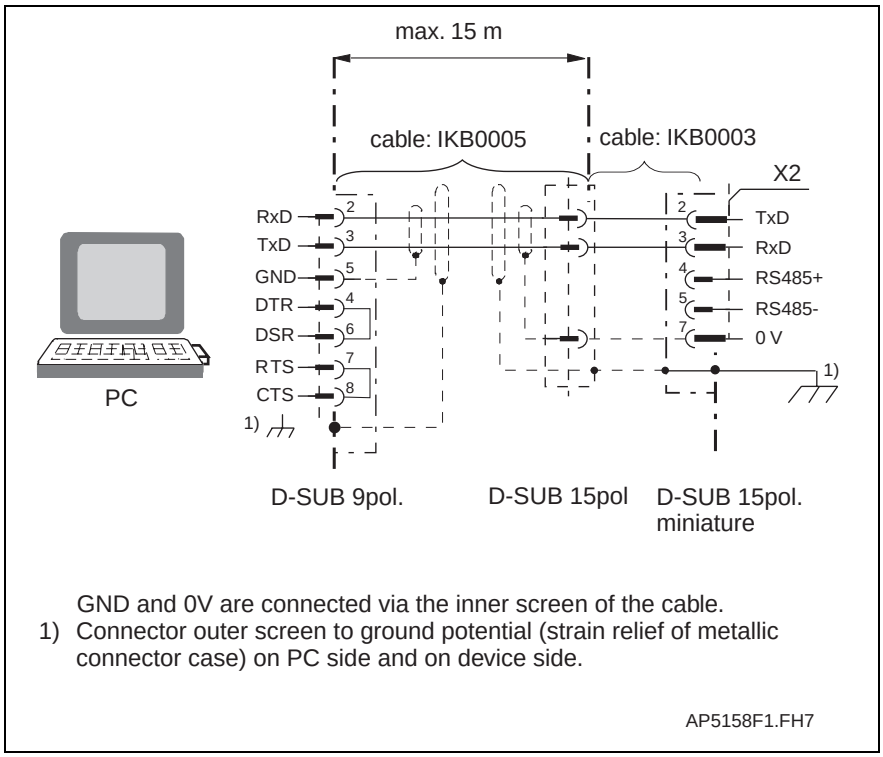


Fig. 1-18: Connection of a PC with the RS-232 interface

Connection Technique RS-485 Interface

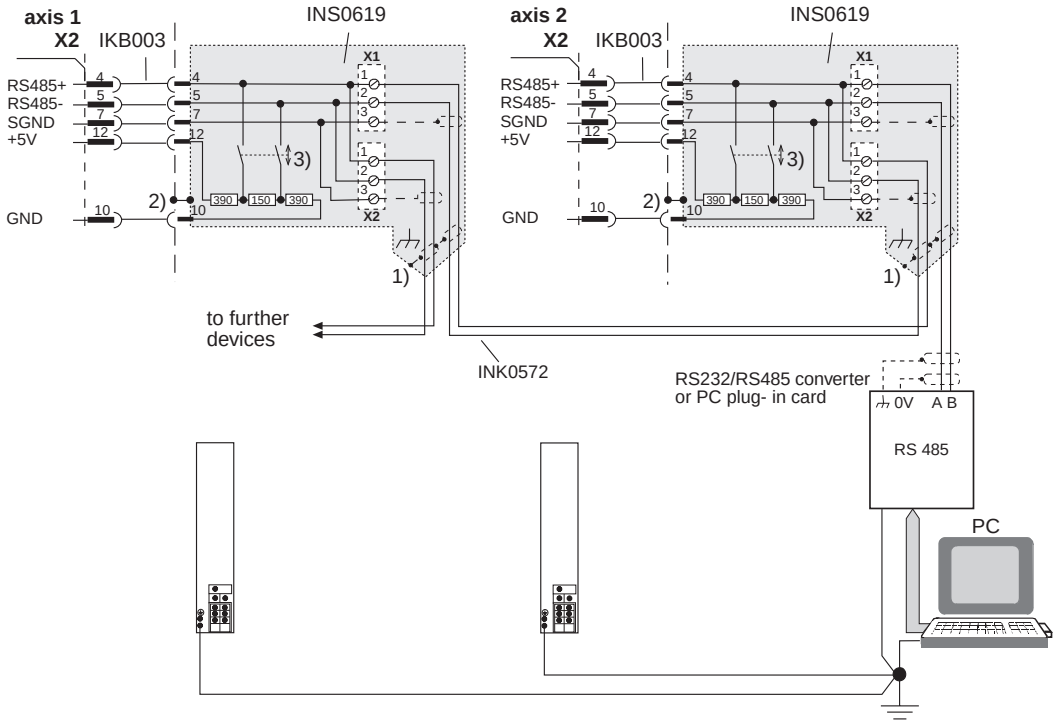
Note: With DIAX04.1 drive controllers, the RS-485 communication is possible since the base hardware change index -07.

Via the RS-485 interface, you can parametrize several drive controllers with *DriveTop* without replugging the interface cable.

You have following possibilities for the operation with RS-485:

- RS-232/RS-485 converter between PC and drives
- RS-485 plug-in card in the PC

Please contact your PC supplier to determine the efficient solution for your application.



1)Connect outer screen to ground potential on PC side or converter side (strain relief of metallic connector case)

2)Connection of device ground with the connector case with the fixation screws of the connector

3) If the drive controller is fitted as the geometrically last participant of a RS- 485 bus, activate the bus termination. Shift switch to I.

Ap5159f1.fh7

Fig. 1-19: Example for connection of the RS-485

Note: For DIAX04.2 drive controllers use the RS-485 connector INS0619.
For DIAX04.1 drive controllers use the RS-485 connector INS0644.

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